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## *HEDYOTIS GALEOTTII* (RUBIACEAE), NEW COMBINATION FOR A MEXICAN SPECIES

Edward E. Terrell and David H. Lorence  
Department of Botany, University of Maryland,  
College Park, Maryland 20742, U.S.A.  
National Tropical Botanical Garden,  
P.O. Box 340, Lawai, Kauai, Hawaii 96765, U.S.A.

### ABSTRACT

Relationships, taxonomic position and nomenclature of *Hedyotis galeottii* are summarized.

KEY WORDS: *Hedyotis galeottii*, Rubiaceae, systematics, México.

*Declieuxia galeottii* Martens is here transferred to *Hedyotis* on the basis of morphology of the flowers, capsules, and seeds. *Manettia liebmännii* Standley is conspecific with *D. galeottii*.

***Hedyotis galeottii* (Martens) Terrell & Lorence, comb. nov.** Based on *Declieuxia galeottii* Martens, in Martens & Galeotti, Bull. Acad. Roy. Sci. Bruxelles 11:231. 1844. Holotype: MÉXICO, Oaxaca: Llano Verde, 3-7000 ft, April 1840, *H. Galeotti* 2603 (BR!). Isotypes: labeled similarly and with same collection number, but BR collection dated March 184\_, and US collection dated March 1841 (or 1847?); these were annotated, apparently by Hemsley, as *D. galeottiana* (BR!, US!).

*Manettia liebmännii* Standley, J. Washington Acad. Sci. 17:337-338. 1927. Holotype: MÉXICO. (presumably Oaxaca): Pelado, August 1842, *F.M. Liebmann* 11485, (C, fragment US 1315772!). Paratype: MÉXICO. (presumably Oaxaca): Cuesta de San Juan del Estado, *F.M. Liebmann* 11487, (C, fragment US 1315771!).

J.H. Kirkbride, Jr. (1976) in his revision of *Declieuxia* noted that *D. galeottii* Martens belonged with *Hedyotis* or related genera. At that time he informed Terrell of the misplacement of the species and transferred to him for study three type specimens lent to him by BR. Later, one of the two isotypes was permanently deposited at US, courtesy of Dr. André Lawalrée on Terrell's request.

The protologue is by Martens only, although both authors were cited in Index Kewensis. Presumably, Galeotti wanted to avoid naming the species



after himself. The protologue provided additional details about the source of *Declieuxia galeottii*: it grew in the forests and on rocky slopes of Llano Verde and Cerro del Malacate, near Rincón, at 3000-7000 ft in the eastern cordillera of Oaxaca. This area is in the Sierra de Juárez, about 40 km due northeast of the city of Oaxaca. In July, 1987, Stephen D. Koch and Terrell searched unsuccessfully for the species near Rincón, nor was it ever encountered by Lorence or other collectors at MEXU during several years of field work in the Sierra de Juárez.

The type specimens that came to Terrell on loan from BR were already designated as to holotype and isotype. We will continue to retain these designations; however, as noted above, the collection date for the holotype is April 1840, that for the isotype at BR is March 184\_ (year blank), and that for the isotype at US is March 1841 (or 1847?). The date given in the protologue is March, year not given. All of the types have the same collection number, 2603. McVaugh (1978) discussed Galeotti's collections and noted inconsistencies in labeling; he listed 1840 as the last year of Galeotti's travels in México.

The type specimens of *Declieuxia galeottii* have mostly flower buds, and the corollas are not fully expanded. There are no seeds. The floral and vegetative morphology show similarities to *Hedyotis kingii* (Terrell) Nesom (*Houstonia kingii* Terrell), which has been collected in Oaxaca along or near route 175 about halfway between Oaxaca city and Tuxtepec in the Sierra de Juárez. We have no doubt that *H. kingii* and *D. galeottii* are congeneric. They are, however, distinct species, as shown by differences in floral morphology; seed differences are pointed out below.

Dr. Joan Nowicke examined the pollen of *Hedyotis kingii* (illustrated in Terrell, Lewis, Robinson, & Nowicke, 1986). After comparing it with *D. galeottii* pollen, she reported (in correspondence) that pollen grains of the two species are similar in the characteristics of the apertures.

*Manettia* species are scandent and have seeds that are strongly flattened and broadly winged with ornately lobed or erose margins. Standley's protologue stated that *M. liebmannii* was "apparently scandent;" however, we cannot find any basis for this opinion. Standley described the seeds as being immature, numerous, compressed, and narrowly winged. There are several seeds in the fragmentary type at US; they agree with Standley's description but are not like the seeds of *Manettia*. In addition, we found seeds in certain of the Veracruz specimens cited below. The seeds are with or without narrow, sometimes partial wings, or sometimes wings may have been present but have been damaged. Wing margins are entire. The seeds are rather similar to those of the Oaxacan species *Hedyotis zestosperma* (Robinson & Greenman) W.H. Lewis (*Houstonia zestosperma* (Robinson & Greenman) Terrell), which is probably related. The seeds of *Hedyotis kingii* are basically similar to those of *M. liebmannii*, but differ in being thicker, not winged, and somewhat polygonal-rounded in outline (Terrell, 1980).

Standley noted in his protologue that *Manettia liebmannii* differed from

other *Manettia* species in having small capsules and flowers, and that "by Hooker the plant was referred to *Hedyotis*." Standley added that the presence of wings on the seeds excluded it from the Oldenlandieae [=Hedyotideae]; however, we disagree with the last statement. In *Hedyotis zestosperma* and *H. intricata* Fosberg (*Houstonia fasciculata* A. Gray) the seeds have partial wings (Terrell, Lewis, Robinson, & Nowicke, 1986).

The type fragment in US of *Manettia liebmannii* consists of the upper part of the stem and an inflorescence. These and the more complete types of *Declieuxia galeottii* are similar in all characteristics. They also came from the same general geographic area: Pelado is near Llano Verde and San Juan del Estado, source of the paratype of *M. liebmannii*, is about 25-30 km north of the city of Oaxaca (communication from R. McVaugh). We believe *D. galeottii* and *M. liebmannii* to be conspecific; thus, *Hedyotis galeottii*, based on the older name, is the correct name.

Several recent collections closely resembling *Declieuxia galeottii* and *Manettia liebmannii* have been studied by both of us from the MEXU, XAL, and ENCB herbaria. These were collected in the Sierra Madre Oriental northeast and northwest of Xalapa, Veracruz, approximately 175 miles north of Llano Verde. These collections have internally densely short-villous corolla lobes. Although corollas of the types discussed previously were less hairy, Standley noted that *M. liebmannii* had the corolla lobes short-villous within. Pending further study we consider the Veracruz collections to represent *Hedyotis galeottii* rather than a new species. The Veracruz collections are as follows: Mun. de Alto Lucero: El Cerro la Cima, entre Plan de las Hayas y Tierra Blanca, 1600 m, *Castillo C. & Narave 2158* (XAL). Mun. de Atzalan: Cerro del Aguila, 850 m, 10 Sep 1982, *Ventura A. 19740* (ENCB); Alseeca, 950 m, 24 Mar 1975, *Ventura A. 11118* (ENCB); La Calavera, 1000 m, 27 Apr 1978, *Ventura A. 15232* (ENCB). Mun. de Naolinco: Naranjillo, 1250 m, 13 Nov 1976, *Ventura A. 13605* (ENCB). Mun. de Yecuatla: Santa Rita, 1450 m, 12 Feb 1973, *Ventura A. 7824* (ENCB); Loma Santa Rita, 1480 m, 12 Jan 1972, *Ventura A. 4764* (ENCB).

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We thank J.H. Kirkbride, Jr. for calling Terrell's attention to *Declieuxia galeottii* and transferring a loan of types; André Lawalrée (BR) helpfully approved (letter, 11 June 1982) transfer of an isotype to US. We also thank Joan Nowicke for pollen data and Rogers McVaugh for data on Liebmann's collections. J.L. Reveal contributed significant nomenclatural advice. This paper is Scientific Article No. A-4893, Contribution No. 7931, of the Maryland Agricultural Experiment Station.

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## TWO NEW SPECIES, NOMENCLATURAL CHANGES, AND RANGE EXTENSIONS IN MEXICAN *ARCEUTHOBIMUM* (VISCACEAE)

Frank G. Hawksworth

USDA Forest Service, Rocky Mountain Forest and Range  
Experiment Station, Fort Collins, Colorado 80526  
and

Delbert Wiens

Department of Biology, University of Utah  
Salt Lake City, Utah 84112

### ABSTRACT

Two new species of *Arceuthobium* are described as parasites of pines (*Pinus*) in México: *A. yecorensense* infects several species of pines (*Pinus*) in eastern Sonora, western Chihuahua, and western Durango; *A. oaxacanum* is known only from two populations in one locality in southern Oaxaca. *Arceuthobium vaginatum* subsp. *durangense* Hawksw. & Wiens is raised to specific status. This taxon was previously known only in Durango and Sinaloa and is reported here for the first time in Jalisco. *Arceuthobium gillii* subsp. *nigrum* Hawksw. & Wiens, also raised to specific status, is widespread in México from Durango to Chiapas on many species of pines. *Arceuthobium abietinum* Engelm. ex Munz, a common parasite of true firs in the western United States, was found north of Temosachic, Chihuahua, on *Abies durangensis* - the first report of it from México. With these additions, 22 taxa of *Arceuthobium* are known from México.

KEY WORDS: *Arceuthobium*, Viscaceae, parasitic plants, forestry, México.

As part of our continuing investigations of the genus *Arceuthobium* in México (Hawksworth & Wiens 1965, 1970, 1972, 1977, 1980, 1984), we describe two new taxa, make two new nomenclatural combinations, and record the occurrence in México of a species previously known only in the United States. With these additions and changes, 22 taxa (19 species and 3 subspecies) are now known from México. This is nearly half the total number of taxa known for *Arceuthobium* worldwide.

The methods we use in our taxonomic studies of dwarf mistletoes are detailed in Hawksworth & Wiens (1972). (Where a range is given for a character, the number in parentheses is the mean).

**Arceuthobium yecorense** Hawksworth & Wiens, sp. nov. TYPE: MÉXICO.

Sonora: Mun. Yecora: 2 km ESE of Yecora, on *Pinus herrerae*, Lat. 28°22' N, Long. 108°54' W, elevation 1600 m, Hawksworth 2168, 7 May 1987.

HOLOTYPE: US; Isotypes: ENCB, FPF, INIF, MO, MEXU, UC.

Plantae 8-17 (12) cm altae; surculi brunneo-virides ad flavo-virides, parce flabellatum ramosi; surculi principales basi 2-5 (3) mm diam, internodio tertio 10-21 (15) mm longo, 2-4 (2.5) mm lato; flores ignoti, anthesis probabilis mense Junio; fructificatio ignoti; plantae in pino parasiticae.

This mistletoe was first collected in 1986 near Yecora, Sonora, by Biol. Ignacio Carbajal V. of Forestal Sanidad, SARH, México City. Later, the senior author found that the dwarf mistletoe was a common parasite of pines south and east of Yecora. Its principal hosts there are *Pinus leiophylla* Schiede & Deppe var. *chihuahuana* (Engelm.) Shaw and *P. herrerae* Martínez. It occurs less commonly on *P. engelmannii* Carr., but does not parasitize associated *P. arizonica* Engelm. The mistletoe was also found a few kilometers into Chihuahua west of Yepachic. In November 1987, the senior author visited the pine forests about 100 km southwest of Santiago Papasquiaro, Durango, where *Arceuthobium yecorense* occurs on *Pinus herrerae*, *P. lumholtzii* Robinson & Fernald, *P. leiophylla* var. *chihuahuana*, *P. engelmannii*, and *P. durangensis* Martínez. As these two known populations are more than 400 km apart, the species probably occurs in intervening forest areas in western Chihuahua and northwestern Durango.

*Arceuthobium yecorense* is characterized by its slender, greenish-yellow to brownish shoots and early summer flowering period. The actual time of anthesis has not been observed, but judging by the state of development of the flowers in early May we suspect that it flowers in June. This species is a member of the subgenus *Vaginatium*, section *Vaginata*. It is morphologically most similar to *A. aureum* subsp. *aureum* of the lowlands of Guatemala and Belize (Hawksworth & Wiens 1977). The *A. yecorense* population in western Durango has more yellowish and slightly taller shoots than the Sonora population, but otherwise they are similar. The specific name is derived from the pueblo of Yecora, the primary pine-producing area of Sonora, where the taxon is common and damaging.

Specimens examined: MÉXICO. Chihuahua: 4 km E of Sonora boundary on Yecora-Maiocova road, on *P. leiophylla* var. *chihuahuana*, Hawksworth 2178 in 1987. Durango: Mun. Otaez: Ojito del Caiman, 49 km SW of Altares on road to Banome, on *Pinus herrerae*, Hawksworth et al. 2249 in 1987; same locality on *P. durangensis*, Hawksworth et al. 2250 in 1987; 63 km SW of Altares on road to Banome, on *P. lumholtzii*, Hawksworth et al. 2252 in 1987. Sonora: Mun. Yecora: Predio Ejidal Mesa el Indio, on *P. herrerae*, I. Carbajal



V. in 1986 (FPF); 6 km W of Chihuahua boundary on Yecora-Maiocova road, on *P. leiophylla* var. *chihuahuana*, Hawsworth 2177 in 1987; Cañada Cabeza de Vaca, 9 km SE of Yecora, on *P. herrerae*, Hawsworth 2170 in 1987; same locality, on *P. engelmannii*, Hawsworth 2171 in 1987.

***Arceuthobium oaxacanum*** Hawsworth & Wiens, sp. nov. TYPE: MÉXICO. Oaxaca: Mun. Tamazulapán: 13 km south of Miahuatlán (and 0.5 km south on dirt side road) off Puerto Angel road (Rte 175), parasite of *Pinus lawsonii*, Lat. 16°10' N, Long. 96°32' W, elevation 2200 m, D. Wiens & C.L. Calvin 6003, 20 August 1985. HOLOTYPE: US; Isotypes: ENCB, FPF, INIF, MO, MEXU.

Plantae 8-20 (12) cm altae; surculi brunneo-rufi, parce flabellatium ramosi, surculi principales basi 2-4 (3) mm diam, internodio tertio 10-17 (12) mm longo, 2-3 mm lato; fructus maturus 3.5 mm longo, 2.3 mm lato; anthesis mense Julio; fructus maturitas mense Agosto; plantae in pino parasiticae.

*Arceuthobium oaxacanum* was first discovered by Dr. R.S. Peterson in 1972 (Hawsworth & Wiens 1977). We originally classed it as an extreme disjunct (of about 1200 km) of *A. rubrum* Hawsw. & Wiens but noted that the Oaxacan plants were somewhat larger than those from the Sierra Madre Occidental in Durango (Hawsworth & Wiens 1977). We have subsequently studied both taxa in the field and conclude that they are distinct species. Some comparative characters of *A. oaxacanum* and *A. rubrum* are given in Table 1. In general, *A. oaxacanum* is a larger, lighter colored, more openly branched plant than *A. rubrum*, and it causes larger witches' brooms. *Arceuthobium oaxacanum* parasitizes principally *Pinus lawsonii* Roehl, *P. michoacana* Martínez, and *P. pseudostrobus* Lindl., and occasionally *P. oaxacana* (Martínez) Mirov; none of which occur in the areas where *A. rubrum* has been found. These two taxa and *A. bicarinatum* Urban of Hispaniola are unique in the genus in having reddish shoots.

Specimens examined: MÉXICO. Oaxaca: 13 km S of Miahuatlán near Puerto Angel road (Rte 175), on *P. pseudostrobus*, Peterson 72-111 in 1972 (FPF); on *P. lawsonii*, Hawsworth, Wiens & Player 1557 in 1975 (FPF); on *P. michoacana*, Hawsworth, Wiens & Player 1561 in 1975 (FPF); and on *P. lawsonii*, Wiens 5981 in 1984 (FPF); 7 km S of Rte 175 on dirt road leaving highway 6 km S of Miahuatlán, Lat. 16°11' N, Long. 96°34' W, on *P. lawsonii*?, Nickrent & Keller 2035 in 1985 (ILL).

***Arceuthobium durangense*** (Hawsworth & Wiens) comb. nov. Basionym: *A. vaginatum* (Willd.) Presl subsp. *durangense* Hawsworth & Wiens, Brittonia 17:230. 1965. Lectotype: MÉXICO. Durango: 59 km west of El Salto on Rte 40, on *Pinus durangensis*, Hawsworth & Wiens 3507, July 1963.

This dwarf mistletoe is characterized by dark orange shoots 25 to 40 cm, and sometimes up to 50 cm, tall. It parasitizes several species of pines, including *Pinus douglasiana* Martínez, *P. durangensis* Martínez, *P. herrerae*, *P.*

Character	<i>Arceuthobium oazacantum</i> (5 collections)	<i>Arceuthobium rubrum</i> (17 collections)
Shoot size	8-20 (mean 12) cm tall; basal diameter of shoots 2-4 (3) mm; third inter- node 10-17 (12) by 2-3 mm; pistillate spikes ca 3 mm long	8-18 (mean 10) cm tall; basal diameter of shoots 2-3 mm; third internode 4-12 (7) by 2-3 mm; pistillate spikes 1-1.5 cm long
Shoot habit	Branching of spikes nearly at right angles to main axis of shoot; shoot clusters open	Branching of spikes usually ca 45 degrees to main axis of shoot clusters dense
Shoot color	Pale brownish to reddish	Dark red to blackish
Witches' brooms	Typically with systemic infections; mistletoe shoots scattered for 3-10 dm along the host branch	Typically with non- systemic infections; mistletoe shoots in small clusters
Distribution	Oaxaca	Durango, Sinaloa
Hosts	<i>Pinus lawsonii</i> <i>Pinus michoacana</i> <i>Pinus oazacana</i> <i>Pinus pseudostrobus</i>	<i>Pinus cooperi</i> <i>Pinus durangensis</i> <i>Pinus engelmannii</i> <i>Pinus herrerae</i> <i>Pinus teocote</i>

Table .1: Comparison of some characteristics of *Arceuthobium oazacantum* and *A. rubrum*.

*michoacana*, *P. oocarpa* Schiede, and *P. pseudostrobus*, along the Pacific escarpment of the Sierra Madre Occidental in México at elevations from 1500 to 3000 m. This species was previously known only from Sinaloa and Durango, but here we report it for the first time from Jalisco (Sierra de Quila). It may also occur in Nayarit. We originally treated this mistletoe as a subspecies of *A. vaginatum* because of its general morphological similarity to that species (Hawksworth & Wiens 1965). However, our subsequent studies of several populations of *A. durangense* and *A. vaginatum* subsp. *vaginatum* in the field indicate that they are distinct species. *Arceuthobium durangense* differs from *A. vaginatum* subsp. *vaginatum* in its dark orange (vs. black) shoots, smaller male flowers, later flowering period, and weaker formation of witches' brooms. These two taxa are apparently not sympatric. Also, *A. durangense* is not sympatric with *A. vaginatum* subsp. *cryptopodum*, the southern limits of which are about 300 km north in Chihuahua. See Hawksworth & Wiens (1972) for additional characteristics of these three taxa.

Specimens examined: MÉXICO. Durango: 59 km W of El Salto on Rte

40, on *P. durangensis*, Hawskworth & Wiens 353 in 1963 (COLO, FPF); 72 km W of El Salto on Rte 40, on *P. michoacana*, Hawskworth & Wiens 354 in 1963 (COLO, FPF) and 1237 in 1969 (FPF); 62 km W of El Salto on Rte 40, on *P. durangensis*, Hawskworth 1422 in 1972 (FPF); 1.6 km W of El Madroño on Rte 40, on *P. michoacana*, Nickrent 2049 in 1985 (FPF, ILL). Sinaloa: 16 km W of Durango boundary on Rte 40, on *P. michoacana*, Mathiasen 8120 in 1981 (FPF); 2 km NE of Tropic of Cancer on Rte 40, on *Pinus douglasiana*, Worthington et al. 9391 in 1983 (FPF, UTEP); 75 km E of Rte 15 on Rte 40, on *P. michoacana*, Hawskworth & Wiens 1234 in 1969 (FPF); 11 km E of Cosala, on *P. michoacana*, Mathiasen 8131 in 1981 (FPF). Jalisco: Sierra de Quila, on *P. michoacana*, Hawskworth 2119 in 1986 (FPF) and on *P. pseudostrobus*, Hawskworth 2220 in 1986 (FPF).

***Arceuthobium nigrum*** (Hawskworth & Wiens) comb. nov. Basionym: *A. gillii* Hawskworth & Wiens subsp. *nigrum* Hawskworth & Wiens. Brittonia 17:223. 1965. Lectotype: MÉXICO. Durango: 51 km E of El Salto on Rte 40, on *Pinus teocote*, Hawskworth & Wiens 3404, March 1963.

This dwarf mistletoe is a widespread parasite of pines in México. It is known from Durango, Zacatecas, Guanajuato, Queretaro, Hidalgo, México, Tlaxcala, Puebla, Veracruz, Oaxaca, Chiapas, and possibly in western Guatemala (Hawskworth & Wiens 1977). This mistletoe is common on *Pinus herrerae*, *P. lawsonii*, *P. leiophylla* vars. *leiophylla* and *chihuahuana*, *P. lumholtzii*, *P. montezumae* Lamb., *P. oaxacana*, *P. patula* Schiede & Deppe, and *P. teocote* Schiede & Deppe, but rare on *P. cooperi* C.E. Blanco. The taxon is similar to *A. gillii* of Chihuahua, northern Durango, southeastern Arizona and southwestern New Mexico in its glaucous fruits, strong sexual dimorphism of branching (very open and divaricate in staminate plants vs. densely branched in pistillate plants), and parasitism of the three members of the *Pinus leiophylla* group. However, the two taxa differ in so many other characters that they are best treated as distinct species. *Arceuthobium nigrum* differs from *A. gillii* in having taller (15-25 [mean 45] cm vs. 10-15 [mean 25] cm) and darker (dark-green to black vs. greenish brown) shoots. Also, an important, recently discovered, difference is that *A. nigrum* has two flowering periods (March-April and September-October) while *A. gillii* has only one (March-April). To our knowledge, these two taxa are not sympatric, but they occur in the same mountain ranges near Tepehuanes in northern Durango. Even there, however, they are separated both elevationally and by hosts: *A. gillii* is at lower elevations (< 2200 m) on *Pinus leiophylla* var. *chihuahuana* and *P. lumholtzii*, while *A. nigrum* occurs at higher elevations (> 2600 m) on *P. teocote* and *P. leiophylla* var. *leiophylla*.

For distributional information on this species, see Hawskworth & Wiens (1972, 1977, 1984) under *A. gillii* subsp. *nigrum*.



*Arceuthobium abietinum* Engelm. ex Munz.

This species is common on several species of *Abies* in the western United States (Hawksworth & Wiens 1972). It is rare in Arizona on *Abies concolor* (Gord. & Glend.) Lindl., where it is known from only four scattered localities, one of which is in the Chiricahua Mountains in Cochise County, about 60 km north of the Mexican border (Mathiasen 1976). A Mexican population was discovered on *Abies durangensis* Martínez in Chihuahua in 1986 by Ing. Juan Antonio Olivo M. of the Mexican Forest Service. The senior author visited the site near Temosachic in May 1987, and confirmed the identification of the taxon. The taxon is presumably f. sp. *concoloris* (Hawksworth & Wiens 1972) because it is the closest known forma specialis (in Arizona) and also because *Abies durangensis* is closely related to *A. concolor*. The locality is about 450 km south of the mistletoe's previously known southern limits in Arizona. *Arceuthobium abietinum* was locally common in a moist, north-south canyon at about 2400 m on *Abies durangensis*, and rare on *Pinus ayacahuite* Ehrenb. var. *brachyptera* Shaw growing under infected *Abies*. Several other trees in the area (*Pseudotsuga menziesii* (Mirb.) Franco, *Picea chihuahuana* Martínez and *Pinus arizonica*) were not parasitized.

Specimens examined: MÉXICO. Chihuahua: Mun. Temosachic: Rio Chachamuri, 18 km N of Yahuirachi, = 7 km W and 61 km N of Temosachic, on *Abies durangensis*, Hawksworth & J. Olivo M. 2185 in 1987 (FPF) and on *Pinus ayacahuite* var. *brachyptera*, Hawksworth & J. Olivo M. 2186 in 1987 (FPF).

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# ADDITIONS AND NOTEWORTHY VASCULAR PLANT COLLECTIONS FROM TEXAS AND LOUISIANA, WITH HISTORICAL, ECOLOGICAL AND GEOGRAPHICAL NOTES

Edwin L. Bridges and Steve L. Orzell  
The University of Texas Herbarium  
Austin, TX 78713

## ABSTRACT

Eighteen species previously unreported for or not currently recognized as occurring in Texas (*Acer leucoderme*, *Carex bromioides*, *Carex verrucosa*, *Cladium mariscoides*, *Lachnocaulon digynum*, *Ludwigia microcarpa*, *Platanthera integra*, *Psilocarya scirpoides*, *Rhynchospora cephalantha*, *Rhynchospora chalarocephala*, *Rhynchospora stenophylla*, *Rhynchospora tracyi*, *Styrax grandifolia*, *Thaspium barbinode*, *Xyris drummondii*, *Xyris fimbriata*, *Xyris scabrifolia* and *Xyris smalliana*) are documented and their habitats and significance are discussed. Additional records are given for *Carex willdenowii*, *Cyperus grayioides*, *Rudbeckia scabrifolia*, *Rudbeckia subto mentosa*, *Rudbeckia triloba*, *Spiranthes parksii*, *Thaspium trifoliatum*, *Urularia perfoliata*, and *Xyris platylepis*, all rare or undercollected species in Texas. Five species (*Lachnocaulon digynum*, *Liatis punctata*, *Palafoxia tezana* var. *ambigua*, *Rudbeckia scabrifolia* and *Xyris scabrifolia*) are reported as new to Louisiana and additional records are given for the rare Louisiana species *Carex verrucosa*, *Ludwigia microcarpa*, *Platanthera integra*, *Polygala crenata*, *Rhynchospora cephalantha*, *Rhynchospora chalarocephala*, *Rhynchospora divergens*, *Scleria verticillata*, *Xyris drummondii* and *Xyris fimbriata*. The need for further floristic exploration of rare and specialized habitats in the West Gulf Coastal Plain of Texas and Louisiana is considered in relation to existing phytogeographic knowledge.

**KEY WORDS:** Floristics, rare plants, Gulf coast.

This paper presents new and noteworthy records for eastern Texas and western Louisiana of vascular plants collected during 1986, 1987 and 1988 field studies by the authors and uncovered while searching herbaria for additional material of these species. These collections indicate that although the general flora of these states is well known, more exploration of rare localized and specialized habitats is still needed in order to fully document the occurrence of plants which are very rare or restricted in their habitat preference in this region. We are considering species as new to or not currently recognized as occurring in Texas if they are not specifically credited to the state in Correll & Johnston (1970) or subsequent papers reporting new state records, although some of these have been documented for Texas in monographs and floras of larger geographical areas. Species are considered new for Louisiana if they are not listed for the state in Thomas & Allen (1982, 1984). MacRoberts (1984),



or subsequent works reporting species new to the state. After identifying our specimens as representing species new or under-documented for these states, we surveyed pertinent literature and regional herbaria for additional collections. We were rather successful in uncovering older records for many of these species, most of which had until our annotations been identified and filed as other more common species or genera, with the others having been fairly recently collected or annotated as representing these records. Herbaria searched for misidentified or overlooked specimens of some or all of these species included ASTC, LAF, LSU, NLU, SBSC, SMU, TAES, TAMU, TEX-LL and Lamar University (LAMA).

We have given full and precise locality information for each specimen in order to make our data more useful to present and future botanists interested in these plants and habitats, without having to borrow specimens solely for obtaining label data. This will facilitate relocation and further investigation of these sites, analysis of geographic and habitat relationships and future work in detecting local extirpations. Where we have several collections of a species, data on the geology, soils and community composition of the sites are summarized under the species discussion. Lists of associated species were calculated based on frequency of close proximity or presence in the same microhabitat, using synthesis tables constructed from the authors' field notes. The abbreviations we have chosen to use in the citation of collection localities include: NF - National Forest, WA - designated Wilderness Area, WMA - State Wildlife Management Area, FS Rd - numbered Forest Service road, FR, FM, I-, LA, R, TX, US - state and national highways and Quad - USGS topographic quadrangle. Vascular plant nomenclature generally follows Kartesz & Kartesz (1980, 1985). Authorities, descriptions and keys for most of the species named in this paper can be found in Clewell (1985), Correll & Johnston (1970), Cronquist (1980), Fernald (1950), Godfrey & Wooten (1979), or Radford et al. (1968).

*ACER LEUCODERME* Small (Aceraceae). TX: Sabine Co: Mesic, partially calcareous, ravine forests in upper reaches of Colorow Creek, N of FS Rd 198, on W side of FM 330 from 3-3.5 mi N of Geneva, Colorow Creek Scenic Area, Sabine NF, Patroon South 7.5' Quad, 31°31'14" N, 93°55'42" W, elev 310-500 ft, 20 Apr 1987, *Orzell & Bridges 5099* (MO, NCU, SMU, TEX); Mesic slope and ravine forests along upper reaches of Mason Creek, on NW side of Sabine Co Rd #37, ca 1 mi W of TX 87, ca 4.5 mi N of Milam, Sabine NF, Milam 7.5' Quad, 31°29'33" N, 93°51'10" W, elev 300-400 ft, 12 Apr 1988, *Orzell & Bridges 6184* (TEX). Tyler Co: Occasional in mesic calcareous ravine forests, ca 3.7 mi NE of Spurger, in deep ravines on W side of Neches River, Spurger 7.5' Quad, 30°44'10" N, 94°08'38" W, elev 75-125 ft, 23 Sep 1986, *Orzell & Bridges 4802* (SMU, TEX); Mesic calcareous slope forest with spring seeps E of Hooper Drive, 0.3 mi NE of FM 92 at a point 0.9 mi N of int FM 1746 at Town Bluff, on E facing slope above B.A. Steinhagen Lake, Town Bluff 7.5' Quad, 30°48'07" N, 94°11'02" W, elev 100-215 ft, 7 Nov 1988, *Orzell & Bridges 8719* (SMU, TEX). Additional collections seen by the authors include:

TX: Jasper Co: 6 mi SE of Jasper, pine-hardwoods, sandy clay soil, 9 Apr 1954, *L.H. Shinnars 18400* (SMU); S of Jasper off Hwy 96 between road to Magnolia Springs and road to Roganville, 14 Apr 1963, *D.S. & H.B. Correll 27228* (LL, SMU); 7 mi S of Jasper, 30 Jun 1963, *Correll, Ogden & Svenson 28104* (LL). Nacogdoches Co: *Cory & Parks s.n.*, n.d., 2 sheets (TAES), no collector, number or date, 2 sheets (TAES). Newton Co: Hwy 87, 1.7 miles south of the 190/87 intersection in Newton. Tree in border of woods along the roadside, trunk whitish, fruit a samara, 27 Jul 1978, *C.D. Peterson 46* (SBSC), determined by L.E. Brown as *A. barbatum* in 1985, annotated as *A. leucoderme* by the authors in 1987; 4 mi S of Newton, N of Cow Creek, bark white, small trees to 25 ft, Oct 19 77, *Lowrey & Dodd s.n.* (TEX). Sabine Co: about 3 mi S of Yellowpine along highway between Hemphill and Burkeville, 27 Jun 1967, *J.W. Thieret 27278* (SMU); 6.7 mi NW of Milam, stream bottom, sandy clay, 7 Jun 1955, *L. H. Shinnars 20215* (SMU); bottoms of Palo-Gaucho Bayou, P.O. Hemphill, elev 240, 13 Jul 1964, *D. Demaree 50812* (SMU).

In Tyler Co, we collected *Acer leucoderme* in mesic ravine forests developed on calcareous clays of the Fleming Formation (Miocene). In Sabine Co, *Acer leucoderme* is found in mesic forests in deep ravines transecting both calcareous and sandy Eocene strata. The most frequent canopy associates include *Carya cordiformis*, *C. ovata*, *C. tomentosa*, *Fagus grandifolia*, *Fraxinus americana*, *Liquidambar styraciflua*, *Quercus alba*, *Q. shumardii* and *Tilia americana*. The most frequent understory tree associates include *Ostrya virginiana*, *Rhamnus caroliniana*, *Acer floridanum*, *A. rubrum*, *Prunus serotina*, *Hamamelis virginiana*, *Carpinus caroliniana*, *Ilex opaca*, *Cornus florida*, *Symplocos tinctoria* and *Cercis canadensis*. Shrub and herb associates at two or more sites include *Aesculus pavia*, *Carex amphibola*, *C. ozylepis*, *C. retrofracta*, *C. willdenowii*, *Cynoglossum virginianum*, *Erythronium rostratum*, *Ilex longipes*, *Lathyrus venosus*, *Lindera benzoin*, *Luzula echinata*, *Mitchella repens*, *Polystichum acrostichoides*, *Rhus radicans*, *Sanguinaria canadensis*, *Solidago auriculata*, *Smilax pumila*, *Styrax grandifolia*, *Thelypteris hexagonoptera*, *Trillium gracile*, *Uvularia perfoliata*, *Viburnum acerifolium*, *V. dentatum* and *Thaspium trifoliatum*. It is significant that our *Acer leucoderme* sites had little or no *Magnolia grandiflora* or *Pinus taeda*, two of the major canopy species of southeast Texas mesic ravine forests and a richer flora of infrequent mesic vernal herbs than most such forests. *Acer leucoderme* is not listed for Texas by Correll & Johnston (1970), Vines (1977) and Nixon (1985). Small (1933) and Sargent (1933) give its range as extending west to Louisiana and Arkansas. Little (1977) and Elias (1980) map *Acer leucoderme* for Sabine and Jasper counties in Texas and Duncan & Duncan (1988) and Cox & Leslie (1988) include southeast Texas in the range. We present our records in order to describe the restricted habitat of this species in Texas and also document its presence in five counties of southeastern Texas. *Acer leucoderme* ranges fairly continuously from North Carolina to Alabama, mostly on the Piedmont Plateau with extensions into adjacent provinces. It also has more isolated occurrences on the Coastal Plain

in Georgia, Florida, Alabama, Mississippi and Louisiana. It is locally common along stream terraces in the Athens Piedmont section of the Ouachita Mountains in Arkansas and Oklahoma. The nearest approach of *Acer leucoderme* to Texas is in west-central Louisiana, where it is known from Caldwell, Natchitoches, Rapides, Sabine, Vernon and Winn parishes. This area is disjunct about 500 km from the more continuous range of the species in central Alabama and is again shown to extend into adjacent southeast Texas.

*CAREX BROMOIDES* Willd. (Cyperaceae). TX: San Augustine Co: Acid seepage swamp forest on S side of TX 21, 0.1 mi E of Palo-Gaicho Bayou, ca 0.6 mi W of Sabine Co line, Geneva 7.5' Quad, 31°28'42" N, 93°59'33" W, elev 270-280 ft Geology - Quaternary Alluvium below Carrizo Sand (Eocene), 18 Apr 1988, Orzell & Bridges 6368 (DUKE, GA, MICH, MO, NCU, SMU, TEX).

This sedge was very common in a seepage swamp forest dominated by *Taxodium distichum*, *Liquidambar styraciflua* and *Nyssa sylvatica* var. *biflora*. The shrub layer was mostly *Itea virginica*, with *Alnus serrulata* and *Carpinus caroliniana*. The dense herb layer consisted primarily of sedges, notably *Carex atlantica* ssp. *capillacea*, *C. debilis*, *C. intumescens*, *C. lurida*, *C. leptalca* and *C. louisianica*. Other herb layer associates included *Athyrium filix-femina*, *Bartonia texana*, *Onoclea sensibilis*, *Platanthera clavellata*, *Saururus cernuus* and *Woodwardia areolata*.

The nearest location to Texas where we have collected this species is a similar habitat in Rapides Par in west-central Louisiana (Orzell & Bridges 7082). *Carex bromoides* ranges primarily in the northeastern United States, becoming less common in the southeastern states and west of the Mississippi River. Mackenzie (1935) records it as occurring south to Florida, Louisiana and Hidalgo. It seems to be rare near the periphery of its range in Florida, Louisiana, Arkansas and Missouri. It is fidel to seep forests in Missouri (Orzell 1984) and Arkansas (Orzell 1985). Our Texas site is the westernmost United States record of *Carex bromoides*, the only member of section *Deweyanae* in Texas.

*CAREX VERRUCOSA* Muhl. (Cyperaceae). LA: Allen Par: SEQ, NEQ, Sec 14, T6S, R6W, Large open flatwoods pond in longleaf pine savannah on W side Allen Par Rd #121, ca 1.6 mi N of US 190 at Le Blanc, Le Blanc 7.5' Quad, 30°32'02" N, 92°56'49" W, 22 Sep 1987, Orzell & Bridges 5787 (NLU, TEX), 24 May 1988, Orzell & Bridges 7037 (TEX); Flatwoods ponds ca 0.3 mi N of US 190, 0.2 mi E of int Allen Par Rd #109, ca 3 mi E of int LA 113 at Reeves, NEQ, NEQ, Sec 20, T6S, R6W, Le Blanc 7.5' Quad, 30°31'21" N, 92°59'51" W, elev 40-45 ft, 24 May 1988, Orzell & Bridges 7030 (SMU, TEX). Calcasieu Par: SWQ, Sec 35, T8S, R9W, Deep open flatwoods ponds on S side of Cypress Lake Dr, from 0.1-0.4 mi W of Sutherland Rd, ca 1 mi N of end of LA Spur 378, Buhler 7.5' Quad, 30°19'13" N, 93°15'45" W, 30 May 1988, Orzell & Bridges 7104 (NLU, TEX); Open graminoid dominated flatwoods ponds in old swale of Sabine River, ca 0.3 mi W of Old River Rd, ca 0.5 mi N of Bess Branch



and 0.8 mi S of Beauregard Par line, 0.5 mi NE of High Hill, ca 6 mi NW of Starks, SH, SWQ, Sec 4, T8S, R13W, Shoats Creek 7.5' Quad, 30°23'24" N, 93°42'07" W, elev 30-35 ft, 31 May 1988, *Orzell & Bridges 7116* (TEX). TX: Chambers Co: In open, sand bottomed ponds on Middleton Prairie, a large, recently burned eastern coastal prairie, ca 2.0 mi ESE of jct of FM 562 (Smith Point Rd) & FM 1985 (Whites Ranch Rd) then ca 2.0 air mi N, E of Chimney Bayou & W of Oyster Bayou, S of Sykes Rd, Oyster Bayou 7.5' Quad, 29°41'50" N, 94°35'12" W, elev 10-15 ft, 1 Jun 1987, *Orzell & Bridges 5406* (TEX). Hardin Co: Wet flatwoods pond known as "Cow Marsh," at crossing of E to W dirt road, reached by dirt road to N off US 96 at a point 1.6 mi NE of int TX 327, E of Silsbee, Evadale 7.5' Quad, 30°22'20" N, 94°07'15" W, elev 33 ft, 16 Apr 1987, *Orzell & Bridges 5051* (TEX); Small, graminoid dominated flatwoods pond on S side of FM 418, ca 1.3 mi E of Village Creek, opposite paved road int, just E of Pea Monk Branch, Kountze North 7.5' Quad, 30°23'32" N, 94°17'03" W, elev 60-65 ft, 16 Apr 1987, *Orzell & Bridges 5060* (SMU, TEX), 31 May 1987, *Orzell, Bridges, & Schotz 5357* (TEX); Flatwoods pond known as "Hut Pond," 0.3 mi S of dirt road, 2.1 mi E of end of FR 420, 5.8 mi E of US 69, S of valley of Village Creek, Kountze North 7.5' Quad, 30°26'56" N, 94°18'53" W, elev 90-95 ft, 16 Apr 1987, *Orzell & Bridges 5064* (MO, NCU, SMU, TEX), *Orzell, Bridges, & Schotz 5363* (TEX). Jasper Co: Open flatwoods pond north of dirt road, 2.4 mi E of LeVerte, 2.9 mi E of US 96, at a point 7.0 mi N of int TX 62 at Buna, Call Junction 7.5' Quad, 30°32'00" N, 94°54'00" W, elev 108 ft, 17 Apr 1987, *Orzell & Bridges 5068* (SMU, TEX). Newton Co: Graminoid cyperoid dominated deep open flatwoods pond ca 2.0 mi N of FR 363, ca 6.5 mi NE of Bleakwood, on E side of Big Cow Creek, ca 0.6 mi N of Sand Ridge Cem, Newton West 7.5' Quad, 30°45'04" N, 93°45'56" W, elev 125 ft, 15 Apr 1988, *Orzell & Bridges 6327* (MO, NCU, SMU, TEX), 23 Aug 1988, *Orzell & Bridges 8230* (SMU, TEX); Intermediate to deep open flatwoods ponds in pine plantations, N of TX 253 on gravel rd 2.6 mi W of jct TX 87, Sudduth Bluff 7.5' Quad, 30°25'50" N, 93°50'40" W, elev 47 ft, 26 Sep 1988, *Orzell & Bridges 8567* (SMU, TEX). San Jacinto Co: Open graminoid dominated flatwoods pond on N side of TX 105, ca 3 mi W of Fostoria and 0.8 mi E of Peach Creek, Fostoria 7.5' Quad, 30°19'34" N, 95°12'39" W, 25 Sep 1987, *Orzell & Bridges 5809* (GA, SMU, TEX), 21 Apr 1988, *Orzell & Bridges 6458* (MICH, NCU, SMU, TEX). Additional collections: LA: Allen Par: Infrequent in wet area along Allen Par 121, ca 3 mi N of Le Blanc (see *O & B 5787*), 20 Apr 1981, *Allen 10684* (LSU). Beauregard Par: *Nyssa* bog in longleaf pine land, north of Merryville on Hwy 446, 6 Apr 1969, *Brown 20342* (LSU). TX: Hardin Co: (same location as *O & B 5051*), 25 May 1977, *G. Watson 2187 & 2187A* (LAMA).

In Louisiana and Texas, *C. verrucosa* is primarily found in herbaceous or graminoid dominated flatwoods ponds on the Deweyville, Beaumont, Montgomery, and Bentley Formations (Quaternary) in Hardin, Jasper and Newton counties, Texas and Allen, Beauregard and Calcasieu parishes, Louisiana. The

Chambers Co collection site floristically and edaphically resembled the other sites, except for the complete absence of trees in the vicinity. The soils of these sites have been mapped primarily as Typic Glossaqualfs and Typic Fra-giaqualfs, and have shallow standing water much of the year, except for summer droughts. Species found at almost every site for *Carex verrucosa* include *Bacopa caroliniana*, *Eriocaulon compressum*, *Gratiola brevifolia*, *Ludwigia sphaerocarpa*, *Nyssa sylvatica* var. *biflora*, *Panicum hemitomon*, *Proserpinaca pectinata*, *Rhynchospora perplexa* and *Xyris iridifolia*. Other frequently associated species include *Cacalia lanceolata*, *Carex glaucescens*, *Cephalanthus occidentalis*, *Erianthus giganteus*, *Eriocaulon decangulare*, *Fuirena breviseta*, *Hydrolea ovata*, *Juncus repens*, *Pluchea rosea*, *Rhexia lutea*, *R. mariana*, *Rhynchospora cephalantha*, *R. corniculata*, *R. elliotii*, *R. filifolia*, *R. latifolia*, *R. tracyi*, *Sphagnum macrophyllum*, *Styrax americana* and *Xyris fimbriata*.

Confusion has existed between this species and *C. glaucescens*, mainly due to the paucity of good material of *C. verrucosa*. Well developed, robust, mature specimens of *C. verrucosa* will still have erect pistillate spikes, with the uppermost sessile. Immature or poorly developed specimens of *C. glaucescens* can also have these characters, but the pedicels greatly elongate on robust and mature fruiting plants. In addition and perhaps more importantly, *C. verrucosa* typically matures fruit from March to July, whereas *C. glaucescens* matures from July to October (Clewell 1985). In southeast Texas, *C. verrucosa* is mature in early April and completely disseminated by early June, whereas *C. glaucescens* does not flower until June through August, has mature fruit generally from August to September and disseminates from early fall into winter. We have occasionally observed that *C. verrucosa* can flower and fruit again in the fall, from September to October, but this seems to be a rare and atypical occurrence. Wilhelm (1984) notes that this species may perhaps be overlooked due to its resemblance to the more frequent *C. glaucescens*.

*Carex verrucosa* ranges almost entirely on the Coastal Plain from North Carolina south to Florida and west to Louisiana. It is common in limesink depression ponds in southwestern Georgia (Thorne 1954, Lynch et al. 1986) and northern Florida and in flatwoods ponds within wetland longleaf pine savannahs on the outer South Atlantic and East Gulf Coastal Plains. The LSU specimens were previously identified as *C. glaucescens* and annotated as *C. verrucosa* by the authors. The only other report of *C. verrucosa* from the West Gulf Coastal Plain is by Dutton (1986) from Cameron Par, Louisiana.

**CAREX WILLDENOWII** Schkuhr. (Cyperaceae). TX: Anderson Co: Lower slope mesic forest on S side of northernmost road through Davey Dogwood Park, ca 0.5 mi W of FR 3309 and just W of small creek crossing, Northwest Palestine 7.5' Quad, 31°47'27" N, 95°38'20" W, elev 520-540 ft, 6 May 1988, Orzell & Bridges 6604 (MICH, NCU, SMU, TEX). Angelina Co: Mature mesic bottomland forest on NW side of FS Rd 303 near crossing of Big Creek, ca 0.7 mi S of FS Rd 302, Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°05'10" N, 94°19'25" W, elev 120-140 ft, 13 Apr 1988, Orzell & Bridges 6223

(SMU, TEX). Hardin Co: Mesic hardwood slope forest S of Village Creek & N of FR 420, 2.6 mi E of US 69, just E of Big Thicket Visitor Center, Turkey Creek Unit, Big Thicket National Preserve, Kountze North 7.5' Quad, 30°27'58" N, 94°20'41" W, elev 75-100 ft, 16 Apr 1987, *Orzell & Bridges 5065* (TEX). Houston Co: Dry-mesic, E facing lower slope forest W of FS Rd 517, ca 0.1 mi N of FS Rd 511, on W side of Hickory Creek, next to the Big Slough WA, Davy Crockett NF, Ratcliff 7.5' Quad, 31°28'17" N, 95°07'53" W, elev 210-240 ft, 20 Apr 1988, *Orzell & Bridges 6431* (MICH, NCU, SMU, TEX). Jasper Co: Old growth mesic calcareous stream terrace forest just S of roadside park on W side of US 96, 1.7 mi S of int US 190 on S side of Jasper, along Big Walnut Run, Jasper East 7.5' Quad, 30°53'17" N, 93°59'27" W, elev 180-190 ft, 17 Apr 1987, *Orzell & Bridges 5073* (SMU, TEX); Small older growth remnant mesic streamside forest on E side of gravel rd, 0.8 mi S of int US 190 opposite int FM 1408 at Holly Springs, along N flowing tributary of Melholmes Creek, Jasper East 7.5' Quad, 30°53'10" N, 93°53'15" W, elev 250-260 ft, 15 Apr 1988, *Orzell & Bridges 6300* (TEX). Liberty Co: Mesic mixed hardwood forest in E facing ravine, just E of Dayton & N of US 90, Dayton 7.5' Quad, 30°03'03" N, 94°52'54" W, elev 30-80 ft, 15 Apr 1987, *Orzell & Bridges 5045* (NCU, SMU, TEX). Nacogdoches Co: Dry-mesic forest on steep slopes on E side of Atascoso (Tuscosso) Creek, N of FM 226, 3.5 mi S of int TX 21 at Oak Ridge, Woden 7.5' Quad, 31°31'35" N, 94°31'56" W, elev 230-300 ft, 2 Apr 1987, *Orzell & Bridges 5033* (GA, MO, NCU, SMU, TEX); Dry-mesic calcareous forest on mid slope (30% slope), NW of Barnes Lake, E of county road, S of Beech Creek, 0.5 mi S of Rusk Co line, Trawick 7.5' Quad, 31°50'12" N, 94°44'39" W, elev 320-360 ft, 14 Apr 1988, *Orzell & Bridges 6268* (SMU, TEX); Mesic calcareous forest on W side of FR 343, ca 2.7 mi W of jct FR 1638, on S side of stream crossing, Nacogdoches North 7.5' Quad, 31°40'30" N, 94°44'35" W, elev 360-400 ft, 14 Apr 1988, *Orzell & Bridges 6291* (MICH, NCU, TEX). Newton Co: Cut-over, sandy mesic forest in dissected topography on N side of county rd, ca 2.2 mi W of US 190 from int just W of valley of Big Cow Creek, ca 4.5 mi W of TX 87 at Newton, Newton West 7.5' Quad, 30°51'20" N, 93°50'33" W, elev 270-330 ft, 15 Apr 1988, *Orzell & Bridges 6312* (SMU, TEX). Red River Co: Old growth mesic slope and wet-mesic bottomland forests S of gravel rd, ca 1.5 mi S of FM 2118 at a point 1.5 mi W of TX 37, on N side of Pecan Bayou, ca 9 mi N of Clarksville, Lennox Woods, Dimple 7.5' Quad, 33°43'58" N, 95°05'10" W, elev 395-420 ft, 26 Mar 1987, *Orzell & Bridges 4917* (GA, MICH, MO, NCU, SMU, TEX). Rusk Co: Mesic stream terrace forest along logging rd ca 200 yds E of Nacogdoches Co Rd #173 ext, ca 2.1 mi N of int FM 1087 (at Freewill Baptist Church), ENE of Sandy Creek crossing, Garrison West 7.5' Quad, 31°52'03" N, 94°34'26" W, elev 380-390 ft, 14 Apr 1988, *Orzell & Bridges 6255* (DUKE, GA, MICH, MO, NCU, NY, SMU, TEX). Sabine Co: Mesic ravine forest in upper reaches of valley of Dorsey Branch, on N side of FR 276 extension, ca 0.4-1.0 mi W of TX 87 at Isla, 5.2 mi N of Milam, East Hamilton 7.5' Quad, 31°30'07" N, 93°51'28" W, elev 300-520 ft, 30 Mar 1987, *Orzell & Bridges 4957* (SMU,



TEX); Mesic, partially calcareous, ravine forests in upper reaches of Colorow Creek, N of FS Rd 198, on W side of FM 330 from 3-3.5 mi N of Geneva, Colorow Creek Scenic Area, Sabine NF, Patroon South 7.5' Quad, 31°31'14" N, 93°55'42" W, elev 310-500 ft, 30 Mar 1987, *Orzell & Bridges 4970* (TEX); Mesic slope and ravine forests along upper reaches of Mason Creek, on NW side of Sabine Co Rd #37, ca 1 mi W of TX 87, ca 4.5 mi N of Milam, Sabine NF, Milam 7.5' Quad, 31°29'33" N, 93°51'10" W, elev 300-400 ft, 12 Apr 1988, *Orzell & Bridges 6177* (TEX); Dry-mesic to mesic slope and ravine forests N of Bennetts Cem, NE of N end of FS Rd 121, along shore of Toledo Bend Res, just S of Shelby Co line, Sabine NF, East Hamilton 7.5' Quad, 31°35'00" N, 93°50'10" W, elev 170-240 ft, 12 Apr 1988, *Orzell & Bridges 6202* (DUKE, GA, MICH, NCU, SMU, TEX). San Augustine Co: Mesic ravine forest below heavily burned pine uplands in upper part of ravine N of FS Rd 300, between FS Rds 300-C and 300-D, ca 1 mi E of FM 1277 at a point 3.6 mi NW of int TX 147, N of Broadus, Bannister WMA, Angelina NF, Broadus 7.5' Quad, 31°22'03" N, 94°15'37" W, elev 260-300 ft, 31 Mar 1987, *Orzell & Bridges 4980* (SMU, TEX); Mesic ravine and slope forests in valley of Clear Branch, on W side of FR 705, ca 2.0 mi S of TX 103, 3.6 mi S of Macune, Angelina NF, Turkey Hill WA, Harvey Creek 7.5' Quad, 31°21'32" N, 94°09'46" W, elev 200-300 ft, 31 Mar 1987, *Orzell & Bridges 4990* (NCU, TEX); Shrub thickets on slope below extensive open flat Weches Formation ironstone outcrop, 0.2 mi SW of gravel rd to Sunrise, 0.9 mi SE of int TX 21 at a point 1.1 mi E of center of San Augustine, San Augustine East 7.5' Quad, 31°30'53" N, 94°05'07" W, elev 350 ft, 18 Apr 1988, *Orzell & Bridges 6342* (TEX). San Jacinto Co: Mesic stream terrace and slope forests along Big Creek, N of FS Rd 217, ca 1.7 mi W of TX 150 at a point 4.6 mi NW of Shepherd, Big Creek Scenic Area, Sam Houston NF, Camilla 7.5' Quad, 30°30'40" N, 95°05'25" W, elev 190-240 ft, 21 Apr 1988, *Orzell & Bridges 6447* (GA, MO, NCU, SMU, TEX). Shelby Co: Mesic mixed hardwood forests in ravines to E of TX 147, 1.5 mi N of jct FM 1279, Sabine NF, San Augustine East 7.5' Quad, 31°37'22" N, 94°05'06" W, elev 340-400 ft, 22 Apr 1987, *Orzell & Bridges 5118* (NCU, SMU, TEX).

*Carex willdenowii*, the only member of section *Phyllostachyae* in Texas, is a typical sedge of mesic, somewhat calcareous or sandy calcareous, ravine, slope and stream terrace forests in southeastern Texas. Although our records would indicate it to be rather frequent, this sedge is actually quite restricted in habitat preference and consequently is unlikely to be encountered in the vast majority of forests of eastern Texas. It is seldom if ever found in pine dominated forests and is often associated with other eastern mesic forest species reaching their western range limits in eastern Texas. It is often found in deep ravines transecting the alternating sandy and calcareous Sparta, Weches, Queen City, Reklaw, Carrizo and Wilcox Formations (Eocene). It is also found on the calcareous Bonham (Cretaceous), Yegua and Cook Mountain (Eocene) and Fleming (Quaternary) Formations, or on stream terraces below these formations. We have also collected *Carex willdenowii* on the dissected escarpments

of the Bentley and Beaumont Formations (Quaternary). *Carex willdenowii* seems to prefer a somewhat nutrient enriched, moist but well drained, sandy loam soil. The soils of our collecting sites have been mapped as Typic Hapludults, Arenic Plinthic Paleudults, Mollic, Typic and Vertic Hapludalfs and Fluvaquentic Dystrochrepts. We have recorded over 240 species as associated with *Carex willdenowii* in Texas. Frequent canopy tree associates include *Fagus grandifolia*, *Tilia americana*, *Acer rubrum*, *Carya cordiformis*, *C. ovata*, *C. tomentosa*, *Frazinus americana*, *Liquidambar styraciflua*, *Magnolia grandiflora*, *Nyssa sylvatica*, *Pinus taeda*, *Prunus serotina*, *Quercus michauxii*, *Q. alba*, *Q. falcata*, *Q. nigra* and *Q. shumardii*. Frequent understory trees include *Acer floridanum*, *A. leucoderme*, *Asimina triloba*, *Carpinus caroliniana*, *Cercis canadensis*, *Cornus florida*, *Hamamelis virginiana*, *Ilex opaca*, *Ostrya virginiana*, *Rhamnus caroliniana* and *Symplocos tinctoria*. Frequent shrub and woody vine associates include *Aesculus pavia*, *Aralia spinosa*, *Arundinaria gigantea*, *Berchemia scandens*, *Callicarpa americana*, *Chionanthus virginicus*, *Euonymus americanus*, *Lindera benzoin*, *Parthenocissus quinquefolia*, *Rhus radicans*, *Sambucus canadensis*, *Smilax pumila*, *Styrax grandifolia*, *Viburnum acerifolium*, *V. dentatum* and *Vitis rotundifolia*. A relatively rich herb layer is present at most *Carex willdenowii* sites. The most frequently associated sedges (in order of descending frequency) are *Carex digitalis*, *C. oxylepis*, *C. amphibola*, *C. physorhyncha*, *C. retroflexa*, *C. striatula* and *C. flaccosperma*, with 11 other *Carex* species recorded from at least one site. Other frequent herbaceous associates include *Allium canadense*, *Arisaema dracontium*, *A. triphyllum*, *Aristolochia serpentaria*, *Asplenium platyneuron*, *Botrychium virginianum*, *Claytonia virginica*, *Cynoglossum virginianum*, *Epifagus virginiana*, *Lilium michauxii*, *Listera australis*, *Luzula echinata*, *Melica mutica*, *Mitchella repens*, *Myosotis macrosperma*, *Oxalis violacea*, *Phlox pilosa*, *Phryma leptostachya*, *Poa autumnalis*, *Podophyllum peltatum*, *Polygonum virginianum*, *Polystichum acrostichoides*, *Salvia lyrata*, *Sanicula gregaria*, *Senecio obovatus*, *Solidago auriculata*, *S. caesia*, *Tipularia discolor*, *Tradescantia hirsutiflora*, *Trillium gracile*, *Valerianella radiata*, *Viola lovelliana* and *V. walteri*. Several additional species are strongly associated with *C. willdenowii* only in deep ravines in Sabine and adjacent San Augustine, Shelby, and Nacogdoches counties and are infrequent in eastern Texas. These include *Brachyelytrum erectum*, *Carex blanda*, *Dentaria laciniata*, *Dioscorea villosa*, *Erythronium rostratum*, *Ilex longipes*, *Lathyrus venosus*, *Lithospermum tuberosum*, *Sanguinaria canadensis*, *Spigelia marilandica*, *Thelypteris hexagonoptera*, and *Uvularia perfoliata*.

In Correll & Johnston (1970) *Carex willdenowii* is referred to as "Rare (if present at all) in extreme e. Tex....said to occur also in Texas, but no material has been seen from the state." The report(s) referred to probably include Britton & Brown (1913), Small (1933), Mackenzie (1935) and Fernald (1950), all of which include Texas in the range of this species. We found this very distinctive sedge at 22 sites in fourteen counties in eastern Texas, despite the

lack of Texas specimens at ASTC, SBSC, SMU, TAES, TAMU, or TEX. Our current data indicate that it is generally absent from northeastern Texas, with the exception of a disjunct occurrence in Red River Co. *Carex willdenowii* generally ranges in the eastern United States west to Indiana and Tennessee and south to Florida and Louisiana. It seems to be most frequent in the southeastern states, particularly on the Coastal Plain. West of the Mississippi River it is restricted to the Coastal Plain, except for a single record in the Ouachita Mountains (Orzell & Bridges 1987). It has apparently not been collected in Oklahoma. The Texas records presented are farther west than all previous reports for *Carex willdenowii*.

*CLADIUM MARISCOIDES* (Muhl.) Torrey (Cyperaceae). TX: Anderson Co: Lower slope seepage peat bog ca 1.0 mi due S of FM 2961 and 0.5 mi E of main road through Engeling WMA, Cayuga 7.5' Quad, 31°58'36" N, 95°52'46" W, elev 270-290 ft, 8 June 1988, Orzell, Bridges & P. Sheridan 7188 (NCU, SMU, TEX), 15 Aug 1988, Orzell & Bridges 7960 (GA, GH, MICH, NY, SMU, TEX). Henderson Co: Stream valley seepage, mucky peat bog on small stream near SW corner of Koon Creek Club, above 2 small lakes and below one lake, ca 1.1 mi N of Anderson Co line, 0.7 mi S of Wilson Lake, Cross Roads 7.5' Quad, 32°02'35" N, 95°52'32" W, elev 340-350 ft, 8 Jun 1988, Orzell, Bridges, & P. Sheridan 7170 (GA, NCU, NY, SMU, TEX), 16 Aug 1988, Orzell & Bridges 8013 (DUKE, FSU, GH, MICH, MO, NCU, NY, SMU, TEX). Additional collections: Smith Co: Swamps, Swan, 10 Jun 1902, J. Reverchon 2920 (SMU).

We found *Cladium mariscoides* in two seepage-fed mucky peat bogs on the Queen City Sand (Eocene) and a Quaternary Terrace below this formation. The soils are mapped as Arenic Paleaquults. *Cladium mariscoides* is an early summer dominant in low, wetter parts of these bogs. Species associated at both sites include *Apios americana*, *Asclepias rubra*, *Carex atlantica* var. *atlantica*, *Coreopsis tripteris*, *Eriocaulon decangulare*, *Gratiola brevifolia*, *Helianthus angustifolius*, *Hydrocotyle umbellata*, *Iris virginica*, *Juncus coriaceus*, *Liatris pycnostachya*, *Mayaca fluviatilis*, *Myrica cerifera*, *Osmunda cinnamomea*, *Pogonia ophioglossoides*, *Ptilimnium costatum*, *Rhezia virginica*, *Rhynchospora chalarocephala*, *Sarracenia alata*, *Scleria reticularis*, *Sphagnum* sp., *Utricularia gibba*, *Woodwardia virginica* and *Xyris torta*.

The continuous range of *Cladium mariscoides* comes closest to Texas near Chicago, Illinois, a disjunction of 1250 km. The nearest old isolated report is that of Mohr (1901) from Baldwin Co in southern coastal Alabama, 800 km from the Texas sites. Harper (1905) collected the only Georgia record, growing with *Carex walteriana* in a grassy cypress pond in Dooly Co. Kükenthal (1942) gives the range of this species as extending south to Delaware, North Carolina, Georgia, Florida and Kentucky and several floras include Florida, Georgia, and Mississippi in its range. Tucker (1987), probably erroneously, reports this species as extending to Missouri. Stuckey & Denny (1981) and the authors have been unable to locate documented records from farther south than South



Carolina (1), North Carolina (7 counties), Virginia (4 counties) and central Indiana and Ohio. In the mountains of Virginia and North Carolina this species is dominant in low areas of standing water in poor fens (Weakley 1979, McLeod & Croom 1983). It is considered a characteristic plant of prairie fens and bog fens in Ohio (Stuckey & Denny 1981). In the Red Lake Peatland of northern Minnesota it occurs in flarks and fen-pools in open minerotrophic fens (Wheeler et al. 1983) and consistently occurs in spring fens in Minnesota (Glaser 1983a, 1987). It is a common species of marl flats in fens in New York (Bernard et al. 1983) and Illinois (Moran 1981). In Michigan, it occurs in emergent aquatic and fen zones in a Kalamazoo Co wetland complex (Sytsma & Pippen 1982) and in standing water in a Berrien Co fen (Kohring 1982). In general, *Cladium mariscoides* is considered an indicator species for fens throughout the northeastern United States (Johnson 1985) and a characteristic rich fen plant in the upper Great Lakes region (Crum 1988). Other plants associated with *Cladium mariscoides* at the Texas sites which are somewhat characteristic of, but not restricted to, northern fens include *Carex stricta*, *Cirsium muticum*, *Dulichium arundinaceum*, and *Thelypteris palustris*. Displacement of peatland plants along nutrient gradients from bogs on the Coastal Plain to fens in the continental interior has been noted in the distribution pattern of several mire species (Glaser 1983b) and may also apply to *Cladium mariscoides*. It seems from comparing species associations and hydrological factors between the Texas sites and those of the northern states that parts of the Texas bog sites may better be described as poor fens.

The Reverchon specimen from Texas was determined as and filed under *Rhynchospora globularis*, although it bore the earlier annotation "*Mariscus* sp.?" by Shirley Gale in 1940. We have so far been unable to relocate the bog at Swan where Reverchon collected numerous disjunct and very rare Texas plants in 1902.

*CYPERUS GRAYIODES* Mohlenbrock (Cyperaceae). TX: Anderson Co: Deep sand savannah ca 0.6 mi W of Catfish Creek and just N of Kidd Springs in Engeling WMA, Cayuga 7.5' Quad, 31°52'35" N, 95°53'10" W, elev 350 ft, 5 Oct 1988, *Orzell & Bridges 8643* (ILL, NCU, SMU, TEX); Openings in sandhill woodland ca 1.0 mi due S of FM 2961 and 0.5 mi E of main road through Engeling WMA, Cayuga 7.5' Quad, 31°58'36" N, 95°52'46" W, elev 270-290 ft, 15 Aug 1988, *Orzell & Bridges 7981* (GA, GH, NCU, SMU, TEX, WIS). Angelina Co: Sand barrens in upland longleaf pine savannah, ca 0.55 air mi ESE of FS Rd 313 & 313A jct, ca 1.4 air mi S of FS Rd 313 & TX 63, in valley of Shearwood Creek, ca 6.5 air mi W of Ebenezer, Angelina NF, Boykin Spring 7.5' Quad, 31°04'27" N, 94°15'45" W, elev 250-300 ft, 10 Nov 1988, *Orzell & Bridges 8754* (TEX). Burleson Co: Deep sand savannah on N side of FR 908, ca 4.1 mi W of TX 21 and 1.0 mi E of Burleson Co Rd #319, Chriesman 7.5' Quad, 30°31'00" N, 96°48'00" W, elev 500-510 ft, 5 Oct 1988, *Orzell & Bridges 8612* (SMU, TEX). Colorado Co: Xeric riparian sandhills 9.8 mi W of Sealy on I-10 at San Bernard River crossing, ca 2.1 mi E of int FM

2761, Eagle Lake 7.5' Quad, 29°44'52" N, 96°17'50" W, elev 195-205 ft, 27 Sep 1988, *Orzell & Bridges 8598* (GA, GH, ILL, NCU, NY, SMU, TEX, WIS). Franklin Co: Sandhill woodlands and sand barrens on S side of FR 900, ca 1.3 mi W of FM 115, 6.2 mi S of I-30 on S side of Mount Vernon, near two springs on topo map, New Hope 7.5' Quad, 33°04'47" N, 95°14'49" W, elev 550-570 ft, 19 Aug 1988, *Orzell & Bridges 8119* (DUKE, F, FSU, GA, ILL, MO, NCU, NY, SMU, TEX, WIS). Freestone Co: Sandhill woodland-barrens just N of Old Zion Cem, ca 0.4 mi S of TX 164 at a point 6.2 mi W of Buffalo (in Leon Co), along headwaters of Rena Branch, Donie 7.5' Quad, 31°28'13" N, 96°09'45" W, elev 460-470 ft, 11 Jul 1988, *Orzell 7347* (ILL, NCU, SMU, TEX). Hardin Co: Clear cut, slash pine planted, deep riverine sandhill on N side of FM 418, ca 0.2 mi E of Village Creek and S of Dry Creek, ca 3.6 mi E of US 69 at Kountze, Kountze North 7.5' Quad, 30°23'55" N, 94°15'38" W, elev 50-60 ft, 23 Aug 1988, *Orzell & Bridges 8170* (DUKE, F, FSU, GA, ILL, MO, NCU, NY, SMU, TEX, WIS); Xeric stream terrace sand ridge ca 0.4 mi S of FM 418 at a point 4 mi W of int US 69/287 in Kountze, on E side of Village Creek, Roy E. Larsen Sandylands Sanctuary, Kountze North 7.5' Quad, 30°23'26" N, 94°15'25" W, elev 50-55 ft, 23 Aug 1988, *Orzell & Bridges 8202* (GA, GH, MO, NCU, SMU, TEX, WIS); Xeric stream terrace sand ridge on N side of TX 327, ca 3.5 mi W of jct FM 498 in Silsbee, ca 0.3 mi E of Village Creek bridge, Roy E. Larsen Sandylands Sanctuary, Silsbee 7.5' Quad, 30°21'00" N, 94°14'10" W, elev 50 ft, 25 Sep 1988, *Orzell & Bridges 8553* (SMU, TEX). Henderson Co: Openings in sandhill woodlands above small stream near SW corner of Koon Creek Club, above 2 small lakes and below one lake, ca 1.1 mi N of Anderson Co line, 0.7 mi S of Wilson Lake, Cross Roads 7.5' Quad, 32°02'35" N, 95°52'32" W, elev 340-350 ft, 16 Aug 1988, *Orzell & Bridges 8021* (F, ILL, NCU, NY, SMU, TEX). Leon Co: Xeric unstable eolian sandhill barrens with blow-outs on broad flat upland ca 0.2 mi W of Cherokee Lake and 0.1 mi N of main road through Hilltop Lakes Resort, 1.8 mi E of FR 3, Hilltop Lakes 7.5' Quad, 31°04'27" N, 96°11'47" W, elev 425-450 ft, 7 June 1988, *Orzell, Bridges, & P. Sheridan 7161* (ILL, NCU, NLU, SMU, TEX); Xeric sandhill woodland-sand barrens at NE corner of intersection of TX 7 and FM 1511 at Hopewell (Eunice on topo map), Eunice 7.5' Quad, 31°19'20" N, 95°48'55" W, elev 320-350 ft, 15 June 1988, *Orzell & Bridges 7302* (GA, MO, TAES, SMU, TEX). Nacogdoches Co: Clear cut, disturbed deep xeric sandhill woodland on sand road through pine plantation, 0.6 mi N of FM 1087 at a point ca 5 mi E of US 259, 0.5 mi S of Rusk Co line and ca 6.3 air miles WNW of Garrison, Garrison West 7.5' Quad, 31°50'17" N, 94°36'09" W, elev 520 ft, 21 Sep 1988, *Orzell & Bridges 8427* (MO, NCU, SMU, TEX, WIS). Newton Co: Bare sand openings in dry longleaf pine savannah, S of FS Rd 196 in Sand Hills area, ca 1 mi S of Sabine Co line, Sabine NF, Fairmount 7.5' Quad, 31°09'34" N, 93°38'15" W, elev 220 ft, 14 Oct 1987, *Orzell & Bridges 5907* (SMU, TEX); Sandhill barrens woodland ca 2.0 mi N of FR 363, ca 6.5 mi NE of Bleakwood, on E side of Big Cow Creek near Sand Ridge Cem, Bleakwood 7.5' Quad,

30°44'15" N, 93°45'50" W, elev 125-136 ft, 23 Aug 1988, *Orzell & Bridges 8212A* (GA, GH, ILL, MO, NCU, NLU, NY, SMU, TEX, WIS); Xeric sand ridge on Big Cow Creek floodplain along US 190, just W of bridge over Big Cow Creek, ca 2.1 mi W of int TX 87 at Newton, Newton West 7.5' Quad, 30°51'10" N, 93°47'52" W, elev 160-170 ft, 23 Aug 1988, *Orzell & Bridges 8232* (NCU, SMU, TEX). Robertson Co: Openings in sandhill woodlands in upper reaches of Mill Creek, upstream from Busby Hollow, ca 1 mi S of Co Rd 333 on sand road, from a point 3.0 mi W of TX 1940, 5.5 mi N of int OSR, Camp Creek Lake 7.5' Quad, 31°00'50" N, 96°21'03" W, elev 380-400 ft, 7 Jun 1988, *Orzell, Bridges, & P. Sheridan 7160* (SMU, TEX); Eolian, unstable deep xeric sandhill barrens SW of Mill Creek, ca 1.3 mi S of Robertson Co Rd #333, at a point 3.5 mi W of FM 1940, to W of transmission line right-of-way, Camp Creek Lake 7.5' Quad, 31°00'34" N, 96°21'34" W, elev 430-460 ft, 5 Oct 1988, *Orzell & Bridges 8626* (DUKE, GA, GH, ILL, MO, NCU, NY, SMU, TEX, WIS). Rusk Co: Clear cut, disturbed deep xeric sandhill on sand road in pine plantations, ca 0.4 mi W of sand road from Nacogdoches Co at a point 1.2 mi N of FM 1087, ca 5 mi E of US 259, 6.5 mi WNW of Garrison, Garrison West 7.5' Quad, 31°50'55" N, 94°36'30" W, elev 510 ft, 21 Sep 1988, *Orzell & Bridges 8420* (GA, ILL, SMU, TEX). San Augustine Co: Burned sandhill woodland barrens dominated by longleaf pine on E side of TX 147 from jct FM 1279 to 0.4 mi S of jct FM 1279, ca 5 mi N of San Augustine, 31°35'56" N, 94°04'53" W, Sabine NF, San Augustine East 7.5' Quad, 15 Oct 1987, *Orzell & Bridges 5913* (SMU, TEX). Shelby Co: Dry sandhill woodland barrens on E side of TX 147, 1.5 mi N of jct FM 1279, 0.1-0.5 mi N of San Augustine Co line, 31°37'17" N, 94°05'24" W, Sabine NF, San Augustine East 7.5' Quad, 15 Oct 1987, *Orzell & Bridges 5919* (SMU, TEX). Smith Co: Sandhill woodland and sand barrens on SW side of jct Loop 323 and Charlotte Dr on NW side of Tyler, ca 0.5 mi W of jct US 69 North, Tyler North 7.5' Quad, 32°22'40" N, 95°20'21" W, elev 500-510 ft, 18 Aug 1988, *Orzell & Bridges 8100* (F, MO, SMU, TEX). Tyler Co: Cleared xeric sandhill woodland barrens on W side of US 69 at intersection of R255, ca 2.2 mi N of Colmesneil, Colmesneil 7.5' Quad, 30°56'15" N, 94°25'02" W, elev 410 ft, 22 Sep 1988, *Orzell & Bridges 8471* (F, GA, MO, NCU, SMU, TEX, WIS). Upshur Co: Sandy roadside, formerly a sandhill woodland, on E side of TX 155, 0.2 mi S of roadside park and 0.3 mi S of jct FR 1002, ca 12 mi S of Gilmer and 2.1 mi N of US 80 at Big Sandy, adjacent to sand mine, Big Sandy 7.5' Quad, 32°36'23" N, 95°05'23" W, elev 300-310 ft, 18 Aug 1988, *Orzell & Bridges 8094* (ILL, NCU, SMU, TEX). Van Zandt Co: Sandhill woodland barrens just E of Big Rock Ch and just W of Sand Hill, ca 2.5 mi S of FR 1256 via Co Rd 2901, ca 5 mi W of TX 19, Phalba 7.5' Quad, 32°22'33" N, 95°56'00" W, elev 580-600 ft, *Orzell & Bridges 8107* (F, ILL, SMU, TEX). Wood Co: Sandhill woodland barrens on sand road S of Co Rd 3978, 0.2 mi S of TX 154 at a point 1.1 mi W of int FR 2869, ca 14.5 mi E of Quitman, Rhonesboro 7.5' Quad, 32°46'25" N, 95°12'20" W, elev 510-520 ft, *Orzell & Bridges 8079* (GA, NCU, SMU, TEX); Sandhill woodlands in



valley of tributary W of Little Cypress Creek, E of power line and spring, S of Co Rd 4596, ca 1.5 mi E of FR 2869, ca 12 mi SE of Winnsboro, Rhonesboro 7.5' Quad, 32°49'05" N, 95°11'05" W, elev 460-500 ft, 18 Aug 1988, *Orzell & Bridges 8084* (TEX). Additional collections: Hardin Co: In sandy scrub oak ridges along east side of Village Creek, Rte #327, between Silsbee and Kountze, 5 Jun 1966, *D.S. Correll 32952* (LL). Leon Co: Dune area at Hilltop Lakes, 11 Sep 1968, *D.S. Correll 36421-B* (LL); Sand dunes at Hilltop Lakes Resort off Rte 3, 6 miles from Normangee, 29 Sep 1968, *D.S. & H.B. Correll 36653* (LL).

In extreme southeastern Texas, *Cyperus grayioides* occurs in dry, sandy, almost barren openings in upland longleaf pine savannahs on xeric stream terrace Pleistocene sand ridges and on the Willis (Quaternary) and Catahoula (Miocene) Formations. In the northern part of southeast Texas (San Augustine, Shelby, Nacogdoches and Rusk counties), it occurs in dry sandhill woodlands on the Carrizo Sand (Eocene). In the Post Oak Belt of east-central Texas, it is found in openings, sometimes with unstable, wind-blown sand, in xeric sandhill woodlands, savannahs, or open sand barrens on the Carrizo, Sparta and Queen City Sand Formations (Eocene) and very rarely on stream terrace sand ridges below these formations. The soils of the Texas sites are primarily Typic Quartzipsamments, with the remainder being the related subgroups of Psammentic Paleudalfs, Grossarenic Paleudults and Arenic Paleudults. Species which are frequently associated with *Cyperus grayioides* throughout most of its Texas range include *Aristida desmantha*, *Bulbostylis ciliatifolia*, *Cassia fasciculata*, *Cnidoscolus tezanus*, *Croton argyranthemus*, *Crotonopsis linearis*, *Dicanthelium acuminatum* var. *villosum*, *Diodia teres*, *Eriogonum multiflorum*, *Euphorbia cordifolia*, *Froelichia floridana*, *Haplopappus divaricatus*, *Helianthemum georgianum*, *Helianthus debilis*, *Hymenopappus artemisiaefolius*, *Ilex vomitoria*, *Lechea villosa*, *Matelea cynanchoides*, *Monarda punctata*, *Opuntia humifusa*, *Paronychia drummondii*, *Paspalum setaceum*, *Polanisia erosa*, *Polypremum procumbens*, *Quercus incana*, *Q. stellata*, *Schizachyrium scoparium*, *Scutellaria cardiophylla*, *Selaginella arenicola* ssp. *riddellii*, *Stillingia sylvatica*, *Stylisma pickeringii*, *Tephrosia virginiana*, *Thelesperma filifolium*, *Tradescantia reverchonii*, *Triplasis purpurea* and *Vaccinium arboreum*. Additional species found primarily at Post Oak Belt sites and rarely associated in southeast Texas include *Bumelia lanuginosa*, *Commelina erector*, *Evax candida*, *Loeflingia squarrosa*, *Oenothera heterophylla*, *Pediomelum subulatum*, *Penstemon murrayanus*, *Spermolepis divaricata*, *Tetragonotheca ludoviciana*, and *Vitis lincecumii*. Species associated only at Post Oak Belt sites include West Gulf Coastal Plain endemic or near-endemic *Aphanostephus skirrhobasis*, *Brazoria pulcherrima*, *Coreopsis basalis*, *C. intermedia*, *Dalea phleoides* var. *microphylla*, *Gaillardia amblyodon*, *Hedyotis subviscosa*, *Phlox drummondii*, *Physalis mollis*, *P. macrophysa*, *Polygonella park-sii*, *Rhododon ciliatus* and *Tradescantia subcaulis*, as well as the more widespread *Allium drummondii*, *Carex muhlenbergii*, *Hymenopappus tenuifolius*,

*Krameria lanceolata*, *Pediomelum digitatum*, *Plantago wrightiana*, *Rhus toxicodendron*, *Sedum nuttallianum* and *Talinum parviflorum*. Associates restricted to southeast Texas sites include *Aristida longespica*, *A. lanosa*, *Berlandiera X betonicifolia*, *Cyperus retrofractus*, *Gaillardia aestivalis* var. *winkleri*, *Gymnopogon ambiguus*, *Heterotheca graminifolia*, *Hypericum hypericoides*, *Pinus palustris*, *Rhynchospora grayi* and *Sassafras albidum*. Additional species most commonly associated in southeast Texas but with one Post Oak Belt site include *Hypericum drummondii*, *Liatris elegans*, *Palafoxia reverchonii*, *Pinus palustris*, *Polygonella polygama*, *Solidago odora* and *Sporobolus junceus*. At least 36 species frequently associated with *Cyperus grayioides* are endemic or near endemic to sand areas within the West Gulf Coastal Plain. Two species which are commonly associated with *Cyperus grayioides* - *Aristida desmantha* and *Stylisma pickeringii* var. *pattersonii*, are similarly disjunct to central Illinois with few intervening locations. Depending on timing of rainfall, *Cyperus grayioides* can flower in Texas at least from May through November and will often reflower after the first set of inflorescences have completely dehisced. At sites with extensive soil disturbance, hybrids between *C. grayioides* and species of section *Umbellati* are possible (Marcks 1972, Tucker 1987). At one Newton Co site, we collected an extensive series of putative hybrids between *C. grayioides* and *C. retrofractus* (Orzell & Bridges 8212B), a previously unreported hybridization. At another Newton Co roadside site, our *C. grayioides* specimens appeared contaminated with *C. globulosus*, also present at the site.

This species was first described from dry sand prairies along the Illinois and Mississippi Rivers in central and northwest Illinois (Mohlenbrock 1959). Currently, it is known in Illinois from 13 sites in 5 counties, with a few additional historical records (Bowles et al. 1986). In Illinois, it occupies the rims of wind formed depressions in open sand of dry sand prairies on terraces of outwash plains of coarse-textured glacial sands (Bowles et al. 1986). The Illinois associates are mostly of genera common to the Texas sites, and *Aristida desmantha*, *Commelina erecta*, *Crotonopsis linearis*, *Monarda punctata*, *Paspalum setaceum* and *Stylisma pickeringii* are associates in both states, a remarkable floristic similarity for areas separated from 900 to 1500 km. In a study of *Cyperus* section *Laziglumi*, Marcks (1972) found specimens of *C. grayioides* from Hardin Co, Texas and Bienville Par, Louisiana. The presence of *Cyperus grayioides* in Texas was first brought to our attention by John Schwegman, since this federal category 2 plant had been recommended for federal threatened status based on its Illinois status (Bowles et al. 1986). Critical study of material not seen by Marcks and of recent collections seems to indicate that *C. grayioides* is an overlooked but fairly widespread xeric psammophyte in the West Gulf Coastal Plain and that the Illinois stations represent isolated and disjunct populations. In addition to the records reported here, the Louisiana Natural Heritage Program records *C. grayioides* from Winn Par, Louisiana (Nelwyn Gilmore, pers. comm.). The Correll collections cited were originally identified as *C. filiculmis*, one Leon Co sheet had been annotated as *C. grayi* by

T. Koyama in 1968 and both Leon Co sheets were annotated as *C. grayioides* by R. Carter in 1987. We have found that in sandy longleaf pine savannahs and sandhill woodlands in the longleaf pine region, *Cyperus grayioides* is generally less frequent than in the Post Oak Belt and is largely replaced by *C. filiculmis*. In the sandhill woodlands of extreme northeastern Texas, Arkansas and Oklahoma, *C. lupulinus* ssp. *lupulinus* occupies similar habitats. We were unsuccessful in searching for *C. grayioides* in the Cretaceous age sandhills of southeastern Oklahoma or in the Eocene sandhills of southwestern Arkansas and extreme northeastern Texas. With diligent collecting in xeric sandhill barren woodlands, uncommon in Louisiana but quite common in eastern Texas, it is likely that many additional county records of *C. grayioides* will be found.

LACHNOCAULON DIGYNUM Körn (Eriocaulaceae). LA: Beauregard Par: Low hillside seepage bog on N side of Memorial Church Rd, 2.2 mi E of US 190-171 at a point 3.1 mi N of int LA 110 at Longville and 9.6 mi S of LA 394 S of DeRidder, NWQ, NWQ, Sec 9, T5S, R8W, Redhead Branch 7.5' Quad, 30°38'58" N, 93°11'54" W, elev 100-110 ft, 22 May 1988, Orzell & Bridges 6939 (TEX), 11 June 1988, Orzell, Bridges, & P. Sheridan 7251 (FSU, MO, NCU, NLU, TEX), 27 July 1988, Orzell & Bridges 7496 (FLAS, GA, LSU, MO, NLU, NY, SMU, TEX, VDB); Low hillside seepage bog in sandy longleaf pine savannah on small tributary of Pullem Branch, ca 0.3 mi E of Pullem Branch Rd at a point 1.8 mi SE of LA 389, 2.5 mi S of Merryville, NWQ, SEQ, SWQ, Sec 18, T4S, R11W, Merryville South 7.5' Quad, 30°42'38" N, 93°32'00" W, elev 80-90 ft, 26 Jul 1988, Orzell & Bridges 7473 (GA, NLU, SMU, TEX); Low hillside seepage bog on small tributary of Pullem Branch, ca 2.5 mi SE of LA 389 at a point 2.5 mi S of Merryville, via Pullem Branch Rd and logging roads, NWQ, NEQ, SEQ, NWQ, Sec 19, T4S, R11W, Merryville South 7.5' Quad, 30°42'16" N, 93°31'52" W, elev 85-95 ft, 26 Jul 1988, Orzell & Bridges 7474 (NLU, TEX). Natchitoches Par: Low hillside seepage slope bordering acid seep forest on E side of FS Rd 570, 0.9 mi N of LA 479, ca 2.5 mi NW of Goldonna, 0.4 mi S of 1st bridge & 0.7 mi S of main bridge over Ragan Creek, 1.4 mi S of FS Rd 585, Kisatchie NF, EH, NWQ, NWQ, Sec 12, T12N, R6W, Goldonna 7.5' Quad, 32°02'37" N, 92°56'23" W, elev 170-200 ft, 12 Jun 1988, Orzell, Bridges, & P. Sheridan 7269 (GA, NCU, NLU, TEX, VDB). Vernon Par: NEQ, SEQ, Sec 12, T1S, R8W, Common in large open hillside seepage bog just NW of int FS Rds 405-1, 405, 445 and 408, area known as "Cravens Bog," Sugartown NW 7.5' Quad, 30°59'27" N, 93°08'10" W, Kisatchie NF, 29 May 1987, Orzell & Bridges 5324 (TEX), 14 Aug 1987, Orzell & Bridges 5741 (FLAS, FSU, MO, NCU, NLU, SMU, TEX, VDB); SEQ, NEQ, Sec 14, T1S, R8W, Occasional in hillside seepage bog on S side FS Rd 405-1, 0.3 mi E of int FS Rds 400 & 471, Sugartown NW 7.5' Quad, 30°58'50" N, 93°09'05" W, Kisatchie NF, 14 Aug 1987, Orzell & Bridges 5727 (NLU, SMU, TEX); NWQ, SEQ, SEQ, Sec 21, T1N, R6W, Rare in small hillside seepage bog just E of stream crossing, on N side FS Rd 405, 0.2 mi W int LA 399 in Ft Polk Impact Area, Fullerton Lake 7.5' Quad, 31°02'40" N, 92°59'05" W, 29 May



1987, *Orzell & Bridges 5334* (TEX), 14 Aug 1987, *Orzell & Bridges 5745* (NLU, SMU, TEX); NEQ, NWQ, Sec 32, T2N, R10W, Common in hillside seepage bog on W facing ravine slope on N side LA 8, opposite int Vernon Par Rd #15, 1.85 mi W of int LA 464, Burr Ferry 7.5' Quad, 31°06'47" N, 93°25'00" W, 30 May 1987, *Orzell & Bridges 5341* (TEX), 13 Aug 1987, *Orzell & Bridges 5723* (GA, NLU, NY, SMU, TEX, VDB). TX: Jasper Co: Rare in upper steep slope hillside seepage bog with sandstone outcrops on tributary of Rock Creek, ca 4 mi E of Browndell (E on FM 1007 for 1.8 mi, then left fork 1.3 mi, right fork 0.2 mi, & left fork 0.4 mi), on property of Mr. Paul Grubbs, Little Rocky Nature Preserve, Harrisburg 7.5' Quad, 31°06'45" N, 93°55'48" W, elev 280-310 ft, 6 Aug 1986, *Orzell & Bridges 4672* (NCU, SMU, TEX). Newton Co: Upper slope hillside seepage bog on W to SW facing slope along Dry Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'00" N, 93°48'43" W, 13 Aug 1987, *Orzell & Bridges 5705* (SMU, TEX); Occasional in lower slope hillside seepage bogs in grazed and periodically burned slash pine plantation (ca 20 years old) on E side of East Prong McKim Creek and W of gravel rd, from 1.5-1.7 mi N of county road int at BM 532, Harrisburg 7.5' Quad, 31°06'24" N, 93°53'24" W, 6 Aug 1986, *Orzell & Bridges 4682* (FSU, GA, NY, TEX, VDB), 13 Aug 1987, *Orzell & Bridges 5691* (MO, NCU, SMU, TEX).

Our collections of *Lachnocaulon digynum* are primarily from hillside seepage bogs on the Catahoula Formation (Miocene) in Texas and escarpments of the Willis and Bentley Formations (Pleistocene) at contacts with other formations in Louisiana. Within these bogs it occurs in areas of low stature fine textured vegetation with copious telluric seepage, usually dominated by *Rhynchospora oligantha* Gray. Frequent associates include *Coreopsis linifolia*, *Drosera capillaris*, *Eriocaulon texense*, *E. decangulare*, *Eryngium integrifolium*, *Lycopodium carolinianum*, *Mitreola sessilifolia*, *Polygala ramosa*, *Rhezia lutea*, *R. petiolata*, *Rhynchospora gracilentia*, *R. latifolia*, *Sarracenia alata*, *Scleria reticularis*, *Sphagnum* sp., *Xyris ambigua*, *X. baldwiniana*, *X. difformis* var. *curtissii* and *X. scabrifolia*.

*Lachnocaulon digynum* was previously thought to be a narrow endemic of the Coastal Pine Meadows and Longleaf Pine Belt sections of the central East Gulf Coastal Plain, extending from near Apalachicola, Florida to Picayune, Mississippi (Kral 1966a). Small (1933) attributed it only to Florida although the type is from Alabama (Harper 1949-50, Kral 1966a) and Moldenke (1937) reported it from Mississippi, Alabama and Florida. Moldenke (1980) records this species from only nine counties, extending west to Harrison Co, Mississippi. By early 1985 it was known from about 22 localities within this region and was considered strongly fidel to herbaceous dominated hillside seepage bogs (Bridges 1985). General habitat requirements of this species seem to be partial or full sun, a seasonally or semipermanently seepage saturated substrate, little shrub or tall herb competition and a substrate of sand, mucky sand, muck, sandy peat, or *Sphagnum* sp. Under natural conditions, these habitats occur

where continuous seepage emerges from adjacent sandy uplands and shrub invasion is prevented by frequent fires (Bridges 1985).

We have collected *Lachnocaulon digynum* from eight sites in Louisiana and three sites in two adjacent counties in Texas. In addition, since 1985 we have added several counties and at least 20 additional sites for this species in Florida, Alabama, and Mississippi. Rangewide, our collections have resulted in more than doubling the known sites for this federal category 2 plant currently under review for possible listing as endangered or threatened. We have searched without success for *Lachnocaulon digynum* in at least 40 other hillside seepage bogs in southeast Texas and several in Beauregard, Natchitoches and Vernon parishes, Louisiana. The Texas and Louisiana locations are disjunct over 400 km from the nearest Mississippi records, and represent the first from the West Gulf Coastal Plain. In addition, the Natchitoches Par site is the northernmost, most inland (250 km from the coastline) and only site on Eocene (Cane River-Sparta Formations contact) strata for *Lachnocaulon digynum*.

*LIATRIS PUNCTATA* Hook. (Asteraceae). LA: Calcasieu Par: Open, frequently burned, clay soil savannah prairie on W side of LA 109, 3.6 mi S of RR crossing at Starks, 0.3-0.5 mi N of Jim Johnson Cut-off Rd, NWQ, SEQ, Sec 24, T9S, R13W, Starks 7.5' Quad, 30°15'32" N, 93°38'45" W, elev 25 ft, Geology - Prairie Terraces (Quaternary), 24 Sep 1988, Orzell & Bridges 8551 (DUKE, F, GA, GH, LSU, MO, NCU, NLU, NY, SMU, TEX, US).

The habitat of our collection seems to be transitional between the clay-based wetland longleaf pine savannahs and the eastern coastal prairies which both occupy the Prairie Terrace of southwestern Louisiana. Closely associated species include *Bigelovia nuttallii*, *Echinacea sanguinea*, *Euthamia leptcephala*, *Hedyotis nigricans*, *Liatris acidota*, *Manfreda virginica*, *Mecardonia acuminata*, *Neptunia lutea*, *Rhynchospora elliottii*, *R. globularis*, *Schizachyrium scoparium* and *Tridens strictus*. Our specimens have the elongated, contorted rootstocks of *L. punctata*, but have a pappus only 8-9 mm long, which is intermediate between the lengths given for *L. punctata* and *L. mucronata* in Correll & Johnston (1970).

Correll & Johnston (1970) give the range of *L. punctata* in Texas as including only about the western quarter of the state, extending east to the western Edwards Plateau. Cronquist (1980) reports *L. punctata* as ranging south to northwestern Arkansas and Texas. In examining specimens at TEX, we found sheets annotated as *L. punctata* by D. Levin from as far east as Tyler and Jefferson counties, Texas. Specimens from Jefferson and Galveston counties were also from coastal prairies. Apparently, there is greater intergradation of the ranges of *L. mucronata*, *L. punctata* and *L. bracteata* in Texas than has been previously reported. At TEX, some specimens labeled *L. bracteata* include stems with the characters of *L. punctata* and several *Liatris* specimens have head and pappus lengths intermediate between *L. punctata* and *L. mucronata*. Correll & Johnston (1970) and Cronquist (1980) both question the distinctiveness of *L. punctata* and *L. mucronata* and this record, apparently

the first authentic report of either species in Louisiana, adds to the evidence for those questions.

*LUDWIGIA MICROCARPA* Michx. (Onagraceae). LA: Calcasieu Par: NWQ, NWQ, Sec 31, T8S, R8W, roadsides through wetland longleaf pine savannah on E side of N Perkins Ferry Rd, 1.8-2.0 mi N of jct LA 378, just S of power line, Moss Bluff 7.5' Quad, 30°19'42" N, 93°13'49" W, 17 Aug 1987, *Orzell & Bridges 5760* (LSU, NLU, TEX), 25 Jul 1988, *Orzell & Bridges 7396* (MO, NCU, SMU, TEX); Roadside adjacent to intermediate depth flatwoods pond on S side of Dunn Ferry Rd, ca 0.6 mi W of Sutherland Rd and 1.1 mi E of West Fork Calcasieu River, ca 9 mi N of Westlake and 6 mi NW of Moss Bluff, NEQ, NEQ, Sec 27, T8S, R9W, Buhler 7.5' Quad, 30°20'34" N, 93°16'02" W, elev 25 ft, 25 Jul 1988, *Orzell & Bridges 7424* (SMU, TEX). TX: Hardin Co: Roadside ditch through former wetland pine savannah on E side of US 69-287, ca 1.0 mi N of Kountze, just S of int with Allen St and TX Highway Dept Bldg, Kountze North 7.5' Quad, 30°23'37" N, 94°19'55" W, elev 95 ft, 18 Aug 1987, *Orzell, Bridges, & G. Watson 5766* (SMU, TEX); Border of large open flatwoods pond on NW side of logging road, ca 0.5 mi S of Beaumont Creek, at BM 88 on topo, 3.2 mi N by logging roads from int with FM 418 E of Pea Monk Branch, Kountze North 7.5' Quad, 30°25'30" N, 94°18'45" W, 18 Aug 1987, *Orzell, Bridges, & G. Watson 5776* (MO, NLU, SMU, TEX).

Our collections of this species are all from roadsides within formerly extensive wetland pine savannahs on the Montgomery and Beaumont Formations (Pleistocene). Associated species include *Rhynchospora colorata*, *R. divergens*, *R. perpleza*, *Scleria verticillata*, *S. georgiana*, *Fuirena breviseta*, *Centella asiatica*, *Pluchea rosea*, *Polypremum procumbens*, *Mecardonia acuminata*, *Mitreola petiolata*, *M. sessilifolia* and *Helianthus angustifolius*.

*Ludwigia microcarpa* ranges primarily in the southeastern United States, north to North Carolina, Tennessee and Missouri and south to Florida, the Bahamas, Cuba and Jamaica. Peng (1982) includes only Calcasieu Par for this species in Louisiana and does not cite any Texas specimens. These are apparently the only West Gulf Coastal Plain locations and are disjunct 400 km from the nearest records in Mississippi and eastward (Orzell & Bridges 1987). *Ludwigia microcarpa* seems to be a rare species in North Carolina, Tennessee, Missouri and Arkansas, as well as in Louisiana and Texas.

*PALAFOXIA TEXANA* DC. var. *AMBIGUA* (Shinners) B.L. Turner & M. I. Morris. (Asteraceae). LA: Allen Par: SEQ, NEQ, Sec 25, T6S, R6W and SWQ, NWQ, Sec 30, T6S, R5W, Dry, cut over sandhill woodland along railroad S of US Hwy 190 and dirt road N of US Hwy 190, 1.3 mi E of Le Blanc and just W of bottomland of Calcasieu River, Le Blanc 7.5' Quad, 30°30'05" N, 92°56'07" W, 15 Aug 1987, *Orzell & Bridges 5758* (NLU, TEX). Additional collections: LA: Allen Par: 7.2 mi W of Kinder, Road fill, sandy clay, 8 Sep 1955, *L.H. Shinners 21531* (SMU).

The sand ridges on the west side of the Calcasieu River and Whiskey Chitto Creek have the most concentrated flora of xeric psammophytes in southwest-



ern Louisiana. Other rare species known from this area and few or no other sites in southwest Louisiana include *Tetragonotheca ludoviciana*, *Paronychia drummondii*, *Tradescantia reverchonii* and *Silene subciliata* (Bridges 1988). *Palafoxia texana* is a species of the Rio Grande Plains of southern Texas and adjacent Mexico and var. *ambigua* was known to occur from Tamaulipas north only to Jackson Co, Texas (Turner & Morris 1976). We have also seen specimens from Harris Co, Texas. Our Louisiana specimens are much more robust than previously reported for this taxon, ranging from 125 to 170 cm tall, compared to the published height range of 20 to 80 cm. By height, they would fall within var. *robusta* of northeast Mexico, but better fit var. *ambigua* in other characters. The extreme size of the Louisiana specimens is likely due to the much greater rainfall than elsewhere in the range. Upon verification of our determination, Dr. B.L. Turner indicated that var. *ambigua* is weedy on sandy soils in south coastal Texas and suggested that our Louisiana collection might represent a railroad adventive. While we cannot rule out that possibility, it is noteworthy that Lloyd Shinnery first collected this species near this locality over 30 years ago and the site supports other psammophytes at their easternmost disjunct location. The Shinnery specimen had been determined and filed as *P. rosea* until our annotation. This is the second possibly adventive species of *Palafoxia* in Louisiana, since *Palafoxia callosa* is known in Louisiana from only a single collection in 1911 from "prairies near railroad" in Acadia Parish, where it may have been a non persistent waif (Darwin et al. 1981). It is interesting that the three species of *Palafoxia* inhabiting dry, sandy habitats in adjacent southeast Texas (*P. hookeriana*, *P. reverchonii* and *P. rosea*) have not been found in Louisiana.

*PLATANTHERA INTEGRATA* (Nutt.) Gray (Orchidaceae). LA: Beauregard Parish: Open burned lower slope seepage bog in longleaf pine savannah on E side US 190 & 171, 4.0 mi S of int LA 394, 0.7 mi S of int Lumas Rd, ca 9 mi S of DeRidder, EH, SEQ, Sec 12, T4S, R9W, Redhead Branch 7.5' Quad, 30°43'43" N, 93°14'09" W, elev 145-155 ft, 15 Aug 1987, Orzell & Bridges 5750 (NLU, TEX). TX: Angelina Co: Mid-slope hillside seepage herb bog, SW of FS Rd 313 & 313A, N of Boykin Spring Lake and Recreation Area, Angelina NF, Boykin Spring 7.5' Quad, 31°04'12" N, 94°16'40" W, elev 270 ft, 26 Aug 1988, Orzell & Bridges 8292 (SMU, TEX). Jasper Co: Upper slope hillside seepage bog, ca 1.4 mi W on FS Rd 313A from FS Rd 313, ESE of FS Rd 313A, on slopes above unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'09" N, 94°16'49" W, elev 230-250 ft, 26 Aug 1988, Orzell & Bridges 8289 (SMU, TEX). Additional collections seen: Hardin Co: 30 Aug 1950, Mrs. J.L. Hooks 50-98 (TEX).

All of our sites for *Platanthera integrata* are hillside seepage bogs which had been burned earlier in the year of our collections. Associated species at the Louisiana site on the Bentley Formation are *Ctenium aromaticum*, *Liatris acidota*, *Rhexia alifanus*, *Sarracenia alata*, *Schizachyrium scoparium* and *Scleria reticularis*. Associates at the Texas sites on the Catahoula Formation in-

cluded *Burmannia capitata*, *Coreopsis linifolia*, *Drosera capillaris*, *Eriocaulon texense*, *Eryngium integrifolium*, *Eupatorium rotundifolium*, *Fuirena squarrosa*, *Liatris pycnostachya*, *Marshallia tenuifolia*, *Mitreola sessilifolia*, *Myrica heterophylla*, *Polygala ramosa*, *Ptilimnium costatum*, *Rhezia petiolata*, *Rhynchospora chalarocephala*, *R. oligantha*, *Rudbeckia scabrifolia*, *Sarracenia alata*, *Scleria reticularis*, *Xyris baldwiniana*, *Xyris drummondii* and *Xyris difformis* var. *curtissii*.

*Platanthera integra* had long been known from Texas solely on the basis of a specimen (*T. Drummond 406*) collected in the last century (Correll 1944, 1950; Correll & Correll 1975; Correll & Johnston 1970). Holnes (1983) excluded *P. integra* from the Texas flora, having re-examined *Drummond 406* and found it to be *Platanthera nivea*. While annotating *Platanthera* at TEX, we noticed an unusual specimen filed under *P. nivea*. Mrs. Hooks had originally identified this plant as *Habenaria integra* and in pencil above the label was the notation "*H. nivea*." We examined this collection and determined it as *P. integra*, particularly on the basis of lip shape and position and spur length. In addition, misidentification in the field of *P. nivea* as *P. integra* would be highly unlikely due to the difference in flower color and distinct separation in flowering dates. Mrs. Hooks' Aug. 30 collection date is well past the flowering time of *P. nivea* (May-June) in Texas and well within the July-September flowering time of *P. integra* throughout its range. All of our collections were in bud to full flower, hence consistent in phenology with this specimen.

Prior to our collections, *P. integra* was considered to be possibly extirpated from Texas. Our Louisiana site may be the same as that of *D.S. & H.B. Correll 9663* (Correll & Correll 1941). The fire dependent nature of *P. integra* (Kral 1983) was clearly indicated by the fact that we had visited one of the Texas sites repeatedly during the summers of 1986 and 1987 without seeing this species. Our field observations in Georgia, Florida and Mississippi have consistently shown *P. integra* to be most conspicuous in wetland savannahs and bogs which were burned during the previous winter.

**POLYGALA CRENATA** James (Polygalaceae). LA: Allen Par: Wetland longleaf pine savannah, recently burned, on S side US 190 and railroad, 0.2 mi W of int Allen Par Rd #109, 3.4 mi W of Le Blanc and 2.8 mi E of Reeves, NWQ, SEQ, Sec 20, T6S, R6W, Reeves 7.5' Quad, 30°31'00" N, 93°00'10" W, elev 40 ft, Geology - Prairie Terraces (Quaternary), Soils - Guyton (Typic Glossaqualfs), 15 May 1987, *Orzell & Bridges 5261* (NLU, TEX). Evangeline Par: Wetland longleaf pine savannah along timber rd from 0.5-0.8 mi W of county rd, 3.7 mi S of LA 10 at a point 0.6 mi S of Beaver, 3.0 mi N of Evangeline Par Rd # 3-119, on slopes E of Caney Creek, NH, NEQ, Sec 9, T4S, R2W, Bond 7.5' Quad, 30°43'33" N, 92°34'28" W, elev 90-100 ft, Geology - Loess-covered Intermediate Terraces (Quaternary). Soils - Glenmora (Glossaquic Paleudalfs), 8 Apr 1988, *Orzell & Bridges 6163* (NLU, TEX). Additional collections: TX: Orange Co: Along marshy swale bordering pine forest, Hwy 87 one mile South of Hartburg (about 13 mi N of Orange), flowers rose-violet, 11 Apr 1957, *F.W.*

Gould 7452 (SMU).

Although listed for Louisiana by Thomas & Allen (1982), this species was synonymized under *P. polygama* by MacRoberts (1984). It is maintained as a distinct species in Kartesz & Kartesz (1980) and Clewell (1985) and seems to be the wetland longleaf pine savannah vicariant of the closely related *P. polygama*. James (1957) noted this habitat separation and gave the range of *Polygala crenata* as from the Florida panhandle west to southeast Louisiana. Our specimens are lax, decumbent plants with broad obovate leaves, a habit quite different from *P. polygama* of drier habitats in our region. Although we have very rarely seen this species, our specimens seem identical to our collection from Franklin Co, Florida (Orzell & Bridges 5203) and maintain the distinctive capsule and seed characters of *P. crenata*. Further collecting is needed in order to definitively prove the distinctiveness of *P. crenata* throughout its range. The Gould specimen was determined and filed as *P. polygama* until our annotation. These are likely the first reports of this species from the West Gulf Coastal Plain and from Texas.

*PSILOCARYA SCIRPOIDES* Torr. (Cyperaceae). TX: Henderson Co: Stream valley seepage, mucky peat bog on small stream near SW corner of Koon Creek Club, above 2 small lakes and below one lake, ca 1.1 mi N of Anderson Co line, 0.7 mi S of Wilson Lake, Cross Roads 7.5' Quad, 32°02'35" N, 95°52'32" W, elev 340-350 ft, Geology - Queen City Sand (Eocene), 16 Aug 1988, Orzell & Bridges 7991 (GA, MO, NCU, NLU, SMU, TEX, VDB). Jasper Co: Along shore of upper reaches of Boykin Spring Lake, at end of FS Rd 313, ca 10 mi SE of Zavalla, Boykin Spring Recreation Area, Angelina NF, Boykin Spring 7.5' Quad, elev 150 ft, Geology - Catahoula Formation (Miocene), 20 Sep 1988, Orzell & Bridges 8364 (SMU, TEX). Newton Co: Wet swale in sandy longleaf pine savannah ca 2.0 mi N of FR 363, ca 6.5 mi NE of Bleakwood, on E side of Big Cow Creek, ca 0.6 mi N of Sand Ridge Cem, Newton West 7.5' Quad, 30°45'04" N, 93°45'56" W, elev 125 ft, Geology - Montgomery Formation (Pleistocene), 23 Aug 1988, Orzell & Bridges 8217 (GA, NCU, SMU, TEX). Additional collections seen: Houston Co: 2 mi S of Grapeland - The Skidmore Place - old lakes, in clump, in mud at edge of water, 2 Oct 1965, Correll & Correll 31810 (LL). Leon Co: (Madison Co on label) On vegetation mats in Normangee Club Lake, about 8 mi W of Normangee, Rte #3, 11 Sep 1968, D.S. Correll 36418 (LL).

The Texas specimens of *Psilocarya scirpoides* are from two quite different types of habitats. Our Henderson Co collection (and presumably the Houston and Leon county specimens) are from the edges of lakes built in valleys formerly supporting deep muck seepage bogs. Associates at the Henderson Co site include *Eleocharis tortilis*, *Eriocaulon decangulare*, *Fuirena squarrosa*, *Hypericum mutilum*, *H. virginicum*, *Rhynchospora capitellata*, *R. corniculata*, *Scleria reticularis*, *Utricularia gibba*, *U. juncea* and *Xyris jupicai*. The Jasper and Newton county sites are from disturbed wet areas in longleaf pine savannahs, with *Eleocharis microcarpa*, *Fimbristylis autumnalis*, *F. vahlii*, *Fuirena*



*breviseta*, *F. squarrosa*, *Polygala nana*, *Rhynchospora chalarocephala*, *R. fascicularis*, *R. filifolia*, *R. pusilla*, *Scleria reticularis*, *Utricularia juncea* and *Viola lanceolata* associated at one or both sites.

The center of distribution for *Psilocarya scirpoides* appears to be on the Atlantic Coastal Plain from Massachusetts to South Carolina, with a few records from Georgia and Florida and disjunct populations in Michigan, Indiana and Wisconsin. It was reported for Washington Par, Louisiana by Allen & Vincent (1982) and for Winn Par by Kessler (1983), but we have not seen these specimens. Kral (1981) reported *P. scirpoides* as new to Alabama from a bog in the Cretaceous sandhills in the center of the state. Most specimens we have seen are from sandy or peaty marshes or margins of lakes. The only states where *Psilocarya scirpoides* occurs but is not state-listed as a rare plant are North Carolina (4 counties), South Carolina (3), Georgia (4) and Florida (2). Surprisingly, the state having the most county records of this species is Michigan (9), with Texas now having the second highest number. The Correll specimens were determined as *Psilocarya nitens* until our annotation. There is some similarity to the range of *P. scirpoides* and that of *Cladium mariscoides* and they occur in close proximity at the Henderson Co site.

**RHYNCHOSPORA CEPHALANTHA** Gray (Cyperaceae). LA: Allen Par: Large open flatwoods pond in longleaf pine savannah on W side Allen Par Rd #121, ca 1.6 mi N of US 190 at Le Blanc, SEQ, NEQ, Sec 14, T6S, R6W, Le Blanc 7.5' Quad, 30°32'02" N, 92°56'49" W, elev 45-50 ft, 22 Sep 1987, *Orzell & Bridges 5786* (NLU, TEX); Deep flatwoods pond/marsh along county road E of Barnes Creek, ca 5 mi S and 2 mi E of Bel, ca 5 mi S of Reeves, SWQ, SWQ, Sec 11, T7S, R7W, Topsy 7.5' Quad, 30°27'11" N, 93°03'47" W, elev 25 ft, 28 Jul 1988, *Orzell & Bridges 7566* (MO, NCU, NLU, NY, SMU, TEX). Beauregard Par: Intermediate depth flatwoods pond on S side of Young's Rd, 0.2 mi W of county rd at a point 1.8 mi S of road along railroad, ca 6.8 mi SW of DeRidder and 1.1 mi SW of Shear, E of Beckwith Creek, NEQ, NWQ, Sec 27, T3S, R10W, Neale 7.5' Quad, 30°46'46" N, 93°22'50" W, elev 185 ft, 26 Jul 1988, *Orzell & Bridges 7450* (MO, NCU, NLU, NY, SMU, TEX). Calcasieu Par: SWQ, Sec 35, T8S, R9W, Deep open flatwoods ponds on S side of Cypress Lake Dr, from 0.1-0.4 mi W of Sutherland Rd, ca 1 mi N of end of LA Spur 378, Buhler 7.5' Quad, 30°19'13" N, 93°15'45" W, 25 Jul 1988, *Orzell & Bridges 7404* (GA, NCU, NLU, SMU, TEX); Flatwoods pond in wetland longleaf pine savannah S of Jug Says Rd, 0.7 mi W of Sutherland Rd, ca 1.8 mi N of end of LA Spur 378 at Sam Houston State Park, ca 8 mi N of Westlake and 5 mi W of Moss Bluff, SWQ, NEQ, NEQ, Sec 34, T8S, R9W, Buhler 7.5' Quad, 30°19'35" N, 93°16'09" W, elev 20-25 ft, 25 Jul 1988, *Orzell & Bridges 7416* (DUKE, FSU, NLU, SMU, TEX); Intermediate depth flatwoods pond on S side of Dunn Ferry Rd, ca 0.6 mi W of Sutherland Rd and 1.1 mi E of West Fork Calcasieu River, ca 9 mi N of Westlake and 6 mi NW of Moss Bluff, NEQ, NEQ, Sec 27, T8S, R9W, Buhler 7.5' Quad, 30°20'34" N, 93°16'02" W, elev 25 ft, 25 Jul 1988, *Orzell & Bridges 7422* (MO, NLU, SMU, TEX).

TX: Hardin Co: Common in low wet pipeline right-of-way through *Cyrilla racemiflora* dominated baygall, ca 1.8 mi SW of jct FM 418 & FM 1122, ca 1.0 air mi S of FM 418 at a point 4.5 mi E of Kountze, ca 0.1 mi N of AT & SF railroad, Roy E. Larsen Sandylands Sanctuary, Deserter Baygall 7.5' Quad, 30°22'52" N, 94°14'52" W, elev 45 ft, 19 Sep 1986, Orzell, Bridges, & G. Watson 4761 (MO, NCU, SMU, TEX); Large graminoid dominated flatwoods pond on NW side of logging rd at BM 88 on topo, ca 0.5 mi S of Beaumont Creek, 3.2 mi N of FM 418, Kountze North 7.5' Quad, 30°25'30" N, 94°18'45" W, 18 Aug 1987, Orzell, Bridges, & G. Watson 5777 (GA, NCU, NLU, SMU, TAMU, TEX); Blackwater sloughs in xeric bluejack oak sandhills, ca 0.5 mi N of Village Creek and 1 mi NE of FR 420, near McNeely Lake, Kountze North 7.5' Quad, 30°28'12" N, 94°18'55" W, 18 Aug 1987, Orzell, Bridges, & G. Watson 5773 (MO, SMU, TEX); Deep, peat-based pond on riverine sand ridge on N side of railroad, ca 0.5 mi E of Village Creek and 0.8 mi S of FM 418, ca 4 mi E of Kountze, Alligator Grass Lake, Roy E. Larsen Sandylands Sanctuary, Kountze North 7.5' Quad, 30°23'02" N, 94°15'20" W, elev 48 ft, 23 Aug 1988, Orzell & Bridges 8198 (FSU, SMU, TEX). Jasper Co: Large open graminoid dominated flatwoods pond north of dirt road, 2.4 mi E of LeVerte, 2.9 mi E of US 96, at a point 7.0 mi N of int TX 62 at Buna, Call Junction 7.5' Quad, 30°32'00" N, 94°54'00" W, 15 Oct 1987, Orzell & Bridges 5924 (TEX), 23 Aug 1988, Orzell & Bridges 8172 (GA, MO, NCU, NY, SMU, TEX). Newton Co: Intermediate to deep open flatwoods ponds in pine plantations, N of TX 253 on gravel rd 2.6 mi W of jct TX 87, Sudduth Bluff 7.5' Quad, 30°25'50" N, 93°50'40" W, elev 47 ft, 26 Aug 1988, Orzell & Bridges 8576 (GA, NCU, SMU, TEX), Orzell & Bridges 8577 (FSU, MO, NY, TEX). Additional collections seen: Hardin Co: 3.5 mi N of Camp Jackson, 12 Sep 1936, H.B. Parks & V.L. Cory 19550, 19551 (det: H. O'Neill, 1942) (TAES); Frequent in shallow water of roadside ditch 2.5 mi NW of Saratoga, 13 Nov 1945, V.L. Cory 50788 (SMU).

*Rhynchospora cephalantha* is a fidel and conspicuous member of the flora of the flatwoods ponds on the Beaumont, Montgomery and Bentley Formations (Quaternary) of the longleaf pine region of the West Gulf Coastal Plain. These physiognomically distinct, open, seasonally inundated depressions usually occur as inclusions within wetland longleaf pine savannahs. The soils of these sites are mapped as Typic Glossaqualfs and Typic Fragiaqualfs. Frequently associated species include *Aristida affinis*, *Bacopa caroliniana*, *Calcia lanceolata*, *Carex verrucosa*, *C. glaucescens*, *Centella asiatica*, *Coreopsis linifolia*, *Eleocharis equisetoides*, *E. tuberculosa*, *Eriocaulon compressum*, *E. decangulare*, *Fuirena breviseta*, *Gratiola brevifolia*, *Hydrolea ovata*, *Hypericum galioides*, *Ludwigia sphaerocarpa*, *Lycopus rubellus*, *Myrica cerifera*, *Nyssa sylvatica* var. *biflora*, *Ozypolis filiformis*, *Panicum hemitomon*, *Platanthera nivea*, *Pluchea rosea*, *Proserpinaca pectinata*, *Rhexia lutea*, *R. mariana*, *Rhynchospora corniculata*, *R. elliottii*, *R. filifolia*, *R. gracilentia*, *R. latifolia*, *R. perpleza*, *Scleria baldwinii*, *Sphagnum macrophyllum*, *Xyris fimbriata* and

*X. iridifolia*. Many of these species are restricted to, co-dominants of and/or modal in flatwoods ponds within the West Gulf Coastal Plain.

*Rhynchospora cephalantha* is not only somewhat difficult to determine in the field, but verification using some keys to the genus tends to confuse determination of this species. The problem lies in the placement of the key couplet for globose vs. turbinate spikelet clusters above that for 1-fruited vs. 2-3-fruited spikelets. Robust specimens of *R. glomerata*, particularly in the southern part of its range, can have the globose spikelet clusters characteristic of *R. cephalantha* and *R. microcephala*. Therefore, these robust *R. glomerata* resemble *R. cephalantha* in the field and key to this species in Godfrey & Wooten (1979) and Clewell (1985). However, the spikelets of *R. glomerata* are always 2-3 fruited, or at least have a second empty inrolled scale on the abaxial side of the achene when only one achene in the spikelet has matured, whereas *R. cephalantha* and *R. microcephala* have 1-fruited spikelets, with no trace of empty scales. We find that this species does key easily in other works (Gale 1944, Fernald 1950, Radford, Ahles, & Bell 1968). We have collected and examined many herbarium sheets with these globose spikelet clusters and 2-3 fruited spikelets, initially identified as *R. cephalantha*, which we had to place in *R. glomerata*. In examining *Rhynchospora* in Texas herbaria we uncovered three additional sheets of this species, the two at TAES having been correctly identified by Hugh O'Neill but apparently overlooked by other workers. The sheet at SMU had been identified as *R. glomerata* until our annotation. *Rhynchospora cephalantha* has also been reported from Allen Par, Louisiana (Allen 1984), however, it is not represented at LAF, LSU, or NLU from other than St. Tammany, Tangipahoa and Washington parishes in Louisiana and specimens from Allen Par at these herbaria originally determined as *R. cephalantha* were all immature *R. glomerata*. Other than the Parks & Cory specimens, our records appear to be the only authentic collections of this species from the West Gulf Coastal Plain.

*RHYNCHOSPORA CHALAROCEPHALA* Fernald & Gale (Cyperaceae).

LA: Beauregard Par: Hillside seepage bog on W side of gravel road, just S of stream crossing, 2.2 mi S of LA 110 at a point 1.0 mi E of LA 27 at Singer, SWQ, NEQ, Sec 17, T5S, R10W, Singer 7.5' Quad, 30°37'42" N, 93°24'24" W, elev 120-140 ft, 26 Jul 1988, Orzell & Bridges 7443 (MO, NLU, NY, TEX); Low hillside seepage bog in sandy longleaf pine savannah on small tributary of Pullem Branch, ca 0.3 mi E of Pullem Branch Rd at a point 1.8 mi SE of LA 389, 2.5 mi S of Merryville, NWQ, SEQ, SWQ, Sec 18, T4S, R11W, Merryville South 7.5' Quad, 30°42'38" N, 93°32'00" W, elev 80-90 ft, 26 Jul 1988, Orzell & Bridges 7468 (GA, NCU, NLU, SMU, TEX); High hillside seepage bog on S facing slope below timber road, ca 3 mi E and 1.2 mi N of Merryville, 0.3 mi N of railroad and S of Bridge Creek, center of NH, SWQ, Sec 28, T3S, R11W, Merryville North 7.5' Quad, 30°46'17" N, 93°30'01" W, elev 130-140 ft, 26 Jul 1988, Orzell & Bridges 7483 (DUKE, FSU, GA, GH, NCU, NLU, NY, SMU, TEX, VDB). TX: Anderson Co: Lower slope seepage peat bog ca 1.0 mi due



S of FM 2961 and 0.5 mi E of main road through Engeling WMA, Cayuga 7.5' Quad, 31°58'36" N, 95°52'46" W, elev 270-290 ft, 15 Aug 1988, *Orzell & Bridges 7972* (DUKE, FSU, GA, GH, NCU, NY, SMU, TEX, VDB). Angelina Co: Upper slope seepage area SE of FS Rd 313A, 1.2 mi W of jct FS Rd 313, on upper slopes of tributary draining S to Boykin Spring Recreation Area, ca 9.7 air miles SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'16" N, 94°16'46" W, elev 250-270 ft, 26 Aug 1988, *Orzell & Bridges 8291* (SMU, TEX); Mid-slope hillside seepage herb bog, SW of FS Rds 313 & 313A, N of Boykin Spring Lake and Recreation Area, Angelina NF, Boykin Spring 7.5' Quad, 31°04'12" N, 94°16'40" W, elev 270 ft, 26 Aug 1988, *Orzell & Bridges 8293* (NCU, SMU, TEX); Lower slope seepage area ca 0.3 mi W on FS Rd 313A from FS Rd 313, above headwaters of unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air miles SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'41" N, 94°16'24" W, elev 310-320 ft, 26 Aug 1988, *Orzell & Bridges 8300* (SMU, TEX); Mid-slope hillside seepage bog ca 0.8 mi W on FS Rd 313A from FS Rd 313, vicinity of headwaters of unnamed tributary to Boykin Spring Lake, ca 9.7 air miles SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'37" N, 94°16'40" W, elev 290-320 ft, 26 Aug 1988, *Orzell & Bridges 8307* (TEX); Upper slope hillside seepage bog ca 1.6 mi S of FS Rd 313 & TX 63, near FS Rd 313 & FS Rd 327, then 0.3 air mi W, on W side of tributary draining S to Boykin Spring Lk, 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'23" N, 94°16'23" W, elev 250-270 ft, 26 Aug 1988, *Orzell & Bridges 8314* (TEX); Upper slope hillside seepage bog, ca 1.9 mi S on FS Rd 313 from TX 63, then 0.2 air mi W to W facing slope above tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'17" N, 94°16'24" W, elev 250-260 ft, 26 Aug 1988, *Orzell & Bridges 8321* (GA, SMU, TEX); Upper slope hillside seepage bog, 0.4 air miles W of FS Rd 302A at a point ca 1.3 mi S of FS Rd 302, ca 0.6 air mi N of Jasper Co line, on slope N of tributary to Big Ck, ca 10 mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'20" N, 94°17'45" W, elev 210-240 ft, 26 Aug 1988, *Orzell & Bridges 8330* (FSU, MO, NY, SMU, TEX); Upper slope hillside seepage bog, ca 1.2 mi S on FS Rd 302A from jct with FS Rd 302, then ca 0.4 air mi W, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'32" N, 94°17'45" W, elev 200-220 ft, 20 Sep 1988, *Orzell & Bridges 8348* (SMU, TEX); Mid-slope hillside seepage bog, ca 1.1 mi S on FS Rd 302A from FS Rd 302, then 0.3 air mi W, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'37" N, 94°17'44" W, elev 220-250 ft, 20 Sep 1988, *Orzell & Bridges 8338* (SMU, TEX); Upper slope hillside seepage bog, W of FS Rd 302A, ca 1.5 mi S of FS Rd 302, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'12" N, 94°17'30" W, elev 210-220 ft, 20 Sep 1988, *Orzell & Bridges 8354* (TEX). Henderson Co: Stream valley seepage, mucky peat bog on small stream near SW corner of Koon Creek Club, above 2 small lakes and below one lake, ca 1.1

mi N of Anderson Co line, 0.7 mi S of Wilson Lake, Cross Roads 7.5' Quad, 32°02'35" N, 95°52'32" W, elev 340-350 ft, 16 Aug 1988, *Orzell & Bridges 8011* (GA, GH, NCU, NLU, NY, SMU, TEX); Stream valley mucky peat seepage herb-shrub bog ca 0.5 mi W of Black Lake and 0.9 mi W of Coon Creek Lake, 1.5 mi WSW of headquarters of Koon Kreek Klub, ca 4 mi W of TX 19, 8 mi S of Athens, Coon Creek Lake 7.5' Quad, 32°04'25" N, 95°51'51" W, elev 355-360 ft, 16 Aug 1988, *Orzell & Bridges 7983* (SMU, TEX). Jasper Co: Mid-slope hillside seepage bog on S side of eroded FS Rd 3078, just E of Millstead Branch, Boykin Spring 7.5' Quad, 31°03'23" N, 94°17'45" W, Angelina NF, 16 Oct 1987, *Orzell & Bridges 5931* (MO, NCU, NLU, NY, SMU, TEX); Upper slope hillside seepage bog, ESE of FS Rd 313A, ca 1.4 mi W of FS Rd 313, on slopes above unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'09" N, 94°16'49" W, elev 230-250 ft, 26 Aug 1988, *Orzell & Bridges 8288* (DUKE, FSU, GA, MO, NCU, SMU, TEX, VDB); Small seepage slopes, artificially opened, along power line right-of-way near headwaters of tributary of Hog Creek, ca 5 mi S of R255 at Rayburn Country via poor logging roads, McGee Bend 7.5' Quad, 31°00'31" N, 94°03'14" W, elev 290-320 ft, 22 Aug 1988, *Orzell & Bridges 8157* (NY, SMU, TEX); Small roadside seepage bog on W side of US 96, 1.2 mi S of R255, Harrisburg 7.5' Quad, 31°02'15" N, 93°58'47" W, elev 370 ft, 23 Aug 1988, *Orzell & Bridges 8164* (NCU, SMU, TEX); Open hillside seepage bog on N side of FS Rd 314, 3.9 mi E of US 69, 0.2 mi W of int FS Rd 330, Boykin Spring 7.5' Quad, 31°02'48" N, 94°20'31" W, elev 150-180 ft, 20 Sep 1988, *Orzell & Bridges 8375* (SMU, TEX). Leon Co: Stream valley shrub-herb deep peat bog at gravel road crossing of Needham Marsh Branch, 3.4 mi N of US 79 at Jewett via Division St, Donie 7.5' Quad, 31°24'05" N, 96°10'36" W, elev 400-430 ft, 11 Jul 1988, *Orzell 7334* (SMU, TEX). Newton Co: Small seepage area in sandy longleaf pine savannah ca 2.0 mi N of FR 363, ca 6.5 mi NE of Bleakwood, on E side of Big Cow Creek N of Sand Ridge Cem, Bleakwood 7.5' Quad, 30°44'15" N, 93°45'50" W, elev 125-136 ft, 23 Aug 1988, *Orzell & Bridges 8219* (NCU, SMU, TEX); Hillside seepage bog, mostly shrub invaded, ca 0.4 mi SE of TX 87 at a point 0.3 mi S of Sabine Co line, on N side of tributary N of Mill Creek and just E of pipeline right-of-way, Fairmount 7.5' Quad, 31°09'26" N, 93°43'45" W, elev 370-380 ft, 25 Aug 1988, *Orzell & Bridges 8243* (GA, SMU, TEX); Hillside seepage bog, almost entirely shrub invaded, ca 2.5 mi E of TX 87 at a point 0.3 mi S of Sabine Co line, at head of small tributary N of Mill Creek, Fairmount 7.5' Quad, 31°09'46" N, 93°41'36" W, elev 300-320 ft, 25 Aug 1988, *Orzell & Bridges 8251* (MO, NY, SMU, TEX); Acid seep forest and hillside seepage bog, ca 2 mi E of TX 87 at a point 0.3 mi S of Sabine Co line, on W side of valley of tributary N of Mill Creek, Fairmount 7.5' Quad, 31°09'47" N, 93°42'03" W, elev 330-350 ft, 25 Aug 1988, *Orzell & Bridges 8263* (SMU, TEX). Sabine Co: Lower slope hillside seepage bog in valley of Shingle Branch, 0.5 mi N of FS Rd 113, 0.5 mi E of TX 87, east of Fox Hunters Hill, Fairmount 7.5' Quad, 31°11'22" N,

93°43'14" W, Sabine NF, 12 Aug 1987, *Orzell & Bridges 5645* (TEX). Wood Co: Streamhead seepage bog, mostly shrub invaded, 0.1 mi N of Co Rd 3245 at a point 0.5 mi E of int Co Rd 3235, ca 0.4 mi upstream from end of SE arm of Lake Lydia, ca 5 air mi SE of Quitman, Quitman 7.5' Quad, 32°46'27" N, 95°22'57" W, elev 390-400 ft, 18 Aug 1988, *Orzell & Bridges 8058* (TEX); Peaty hillside seepage bog on W side of Co Rd 3235, 0.5 mi N of Co Rd 3245, at head of SE arm of Lake Lydia, 0.1 mi S of dam of Quitman Club Lake, ca 4.5 air mi SE of Quitman, Quitman 7.5' Quad, 32°46'33" N, 95°23'12" W, elev 380 ft, 18 Aug 1988, *Orzell & Bridges 8072* (TEX). Additional collections: LA: Vernon Par: Seepage area in longleaf pine woods west of US FS Rd 440 near Little Six Mile Creek, NW of Fullerton, 15 Jul 1980, *Thomas & Grelen 71857* (NLU); Hillside bog beside FS 405 just west of FS 434 north of Pitkin, edge of Fort Polk Military Reservation in Kisatchie NF, Sec 28, T1N, R6W, 22 Aug 1981, *Thomas, Kessler, & McCoy 78156* (NLU). TX: Angelina Co: SE of Zavalla on US 63, 0.5 mi NW of Angelina-Jasper Co line, pitcher plant bog area, rare to occasional, 11 Aug 1978, *Nixon et al. 8717* (ASTC); ca 0.5 mi S of jct FR 338 & 330 on 328 to high point, occasional at seepage slopes, 30 Jul 1980, *Ward & Hupp 417* (ASTC). Jasper Co: ca 0.2 mi E of jct FR 309 & FR 302A near Boykin Spring, seepage slopes with pitcher plants and wet woods, locally rare-occasional, 12 Jul 1980, *Ward 761* (ASTC); Hillside bog along FR 314 ca 100 yds W of int FR 330 in Angelina National Forest, N of Neches River, 2 Aug 1986, *L.E. Brown 10593* (ASTC, SBSC).

*Rhynchospora chalarocephala* is a common late-summer to fall fruiting species of hillside seepage bogs in the longleaf pine region of Texas and Louisiana and much of the Post Oak Belt of Texas. It can occur both in the open bogs and at the ecotone between these bogs and acid seep forests, often on *Sphagnum* hummocks. In the Longleaf Pine Belt, it is found on the Catahoula (Miocene), Willis and Bentley (Quaternary) Formations, particularly on escarpments, slopes, or contacts with other formations. The Newton Co site was unusual in being on a Quaternary sand ridge of Montgomery Formation age and not associated with a hillside bog. Sites in the Post Oak Belt of Texas were on the Queen City and Carrizo Sand Formations (Eocene). Species which are frequently associated with *R. chalarocephala* throughout most of its West Gulf Coastal Plain range include *Acer rubrum*, *Aletris aurea*, *Asclepias rubra*, *Aster umbellatus*, *Burmannia capitata*, *Calopogon tuberosus*, *Centella asiatica*, *Drosera capillaris*, *Eriocaulon decangulare*, *E. texense*, *Eryngium integrifolium*, *Eupatorium rotundifolium*, *Fuirena squarrosa*, *Helianthus angustifolius*, *Hypericum stans*, *Liatris pycnostachya*, *Lobelia reverchonii*, *Lycopodium appressum*, *Mitreola sessilifolia*, *Myrica cerifera*, *Osmunda cinnamomea*, *O. regalis*, *Panicum virgatum*, *Ptilimnium costatum*, *Rhezia mariana*, *Rhynchospora glomerata*, *R. gracilentia*, *R. oligantha*, *Sarracenia alata*, *Scleria reticularis*, *Solidago rugosa*, *Sphagnum* sp., *Utricularia juncea*, *Viburnum nudum*, *Woodwardia virginica*, *X. ambigua* and *X. baldwiniana*. Species frequently associated only at Post Oak Belt sites include *Apios americana*, *Boehmeria cylindrica*, *Cyperus*



haspan, *Eleocharis equisetoides*, *Hydrocotyle umbellata*, *Hypericum mutilum*, *H. virginicum*, *Iris virginica*, *Panicum hemitomom*, *Peltandra virginica*, *Rhezia virginica*, *Rhynchospora capitellata* and *Vernonia missurica*. Frequent associates at Post Oak Belt sites which are associated at few Longleaf Pine Belt sites include *Alnus serrulata* *andropogon glomeratus*, *Erianthus giganteus*, *Eupatorium perfoliatum*, *Gratiola brevifolia*, *Ludwigia sphaerocarpa*, *Mayaca fluviatilis*, *Nyssa sylvatica* var. *biflora*, *Polygala cruciata*, *Woodwardia areolata*, *Xyris jupicai* and *X. torta*. Frequent associates at Longleaf Pine Belt sites which are associated at few Post Oak Belt sites include *Agalinis fasciculata*, *Gratiola pilosa*, *Hypoxis hirsuta*, *Liquidambar styraciflua*, *Ozypolis rigidior*, *Pogonia ophioglossoides*, *Rhynchospora macra*, *Viola primulifolia* and *Xyris difformis* var. *curtissii*. Frequent associates found only at Longleaf Pine Belt sites include *Carex glaucescens*, *Coreopsis linifolia*, *Hyptis alata*, *Ilex coriacea*, *Lachnocaulon anceps*, *Ludwigia hirtella*, *Lycopodium carolinianum*, *Magnolia virginiana*, *Marshallia tenuifolia*, *Myrica heterophylla*, *Persea borbonia*, *Pinguicula pumila*, *Pinus palustris*, *P. taeda*, *Polygala ramosa*, *Pyrus arbutifolia*, *Rhezia lutea*, *R. petiolata*, *Rhus vernix*, *Rhynchospora plumosa*, *Rudbeckia scabrifolia*, *Smilax laurifolia*, *Xyris drummondii* and *X. scabrifolia*.

When this species was first described, it was presumed common in New Jersey, North Carolina and South Carolina, with two collections from Virginia and one each from Delaware and Florida (Fernald 1940). Gale (1944) added Maryland to the range. Godfrey & Wooten (1979) extended the range to include the Gulf states west to Louisiana. Joyce (1974) does not include this species for Louisiana, although we have annotated a specimen at LAF (Joyce 521) from Washington Par which he had originally determined as *R. cephalantha*. Although reported from Allen Par, Louisiana (Allen 1984), we found the Allen Par specimens originally identified as *R. chalarocephala* at LAF, LSU and NLU to represent immature *R. glomerata*. The collections cited from ASTC and SBSC had been determined as *R. capitellata* until our annotation.

**RHYNCHOSPORA DIVERGENS** Chapm. ex M.A. Curtis (Cyperaceae). LA: Calcasieu Par: NWQ, NWQ, Sec 31, T8S, R8W, roadsides through wetland longleaf pine savannah on E side of N Perkins Ferry Rd, 1.8-2.0 mi N of jct LA 378, just S of power line, Moss Bluff 7.5' Quad, 30°19'42" N, 93°13'49" W, 25 Jul 1988, Orzell & Bridges 7394 (NLU, NY, TEX).

Associates of *Rhynchospora divergens* at our Louisiana site *Ludwigia microcarpa*, *Rhynchospora colorata*, *R. perpleza*, *Scleria verticillata*, *S. georgiana*, *Fuirena breviseta*, *Centella asiatica*, *Pluchea rosea*, *Polypremum procumbens*, *Mecardonia acuminata*, *Mitreola sessilifolia* and *Helianthus angustifolius*.

The United States range of *R. divergens* has usually been stated as from South Carolina south to Florida and west to Texas, however, we have seen no specific reports or specimens of this species from Louisiana. It is listed for Louisiana by Thomas & Allen (1984), but not by Joyce (1974) or MacRoberts (1984). We did not find specimens of *R. divergens* for Louisiana at LAF, LSU, or NLU. It is fairly common on coastward Quaternary Terraces from

Hardin and Tyler west to Montgomery, Harris and Galveston counties, Texas and is disjunct to Aransas Co, Texas. We have one site for *R. divergens* on the Caddell Formation in Angelina Co, Texas (Orzell & Bridges 4496), possibly the only site on Eocene strata for this species. We have no record for Mississippi, although it likely occurs there on the outer Coastal Plain.

*RHYNCHOSPORA STENOPHYLLA* Chapm. ex M.A. Curtis (Cyperaceae). TX: Anderson Co: Lower slope seepage peat bog ca 1.0 mi due S of FM 2961 and 0.5 mi E of main road through Engeling WMA, Cayuga 7.5' Quad, 31°58'36" N, 95°52'46" W, elev 270-290 ft, 8 Jun 1988, Orzell, Bridges, & P. Sheridan 7184 (TEX), 15 Aug 1988, Orzell & Bridges 7954 (NY, TEX). Wood Co: Streamhead seepage bog, mostly shrub invaded, 0.1 mi N of Co Rd 3245 at a point 0.5 mi E of int Co Rd 3235, ca 0.4 mi upstream from end of SE arm of Lake Lydia, ca 5 air miles SE of Quitman, Quitman 7.5' Quad, 32°46'27" N, 95°22'57" W, elev 390-400 ft, 18 Aug 1988, Orzell & Bridges 8054 (TEX).

Our Texas records of *Rhynchospora stenophylla* are from ombotrophic, quaking peat bogs on or adjacent to the Queen City Sand (Eocene). Associates at both sites include *Acer rubrum* *andropogon glomeratus*, *Aster umbellatus*, *Drosera capillaris*, *Eriocaulon decangulare*, *Eryngium integrifolium*, *Eupatorium perfoliatum*, *E. rotundifolium*, *Fuirena squarrosa*, *Helianthus angustifolius*, *Hydrocotyle umbellata*, *Liquidambar styraciflua*, *Lobelia reverchonii*, *Ludwigia sphaerocarpa*, *Mayaca fluviatilis*, *Myrica cerifera*, *Ptilimnium costatum*, *Rhezia virginica*, *Rhynchospora chalarocephala*, *R. gracilentia*, *R. oligantha*, *Sarracenia alata*, *Scleria reticularis*, *Utricularia cornuta*, *Woodwardia areolata*, *W. virginica*, *Xyris baldwiniana*, *X. jupicai* and *X. torta*. Regionally uncommon species found at one of the two sites include *Aster scabriceaulis*, *Cirsium muticum*, *Cladium mariscoides*, *Coreopsis tripteris*, *Rhynchospora macra*, *Thelypteris palustris* and *Zigadenus densus*.

Kral (1977) reports this species as occurring only in the Carolinas, northwestern Florida, and southern Alabama and provides an excellent summary of its distinctive characters. Our search for literature reports uncovered only eight total counties previously known for *R. stenophylla*. Joyce (1974) and Taylor & Thomas (1985) report *R. stenophylla* from Washington Par, Louisiana and MacRoberts (1984) includes it on the basis of Joyce's report. It is not listed in Thomas & Allen (1984), but is listed for Allen Par by Allen (1984). There are no Louisiana specimens of *R. stenophylla* at LAF, LSU, or NLU. We consider Washington Par to have had potential habitat for this species, but are not aware of potential habitat in Allen Par. We have observed *R. stenophylla* to be a fidel indicator of deep, sapric peaty bogs in southern Mississippi, its nearest verified location to Texas. We have collections from Harrison (7893, TEX; 7937A, TEX), Jackson (7731, TEX) and Stone (7854, TEX) counties in southern Mississippi, adding two counties to its previous known range in the state.

*RHYNCHOSPORA TRACYI* Britt. (Cyperaceae). TX: Hardin Co: Small, graminoid dominated flatwoods pond adjacent to baygall on S side FM 418,

just S of gravel rd int, E of Pea Monk Branch, Kountze North 7.5' Quad, 30°23'32" N, 94°17'03" W, 18 Aug 1987, Orzell, Bridges, & G. Watson 5780 (FSU, GA, MO, NCU, NLU, NY, SMU, TAES, TEX, VDB); Large graminoid dominated flatwoods pond 0.3 mi S of dirt rd, 2.1 mi E of end of FR 420, 5.8 mi E of US 69, Kountze North 7.5' Quad, 30°26'56" N, 94°18'53" W, 25 Sep 1987, Orzell & Bridges 5804 (NCU, SMU, TEX). Jasper Co: Large open graminoid dominated flatwoods pond N of dirt road, 2.4 mi E of LeVerte, 2.9 mi E of US 96, 7 mi N of TX 62 at Buna, Call Junction 7.5' Quad, 30°32'00" N, 94°54'00" W, 15 Oct 1987, Orzell & Bridges 5925 (SMU, TEX), 23 Aug 1988, Orzell & Bridges 8173 (FSU, GA, MO, NCU, NLU, TEX, VDB). Newton Co: Intermediate to deep open flatwoods ponds in pine plantations, N of TX 253 on gravel rd 2.6 mi W of jct TX 87, Sudduth Bluff 7.5' Quad, 30°25'50" N, 93°50'40" W, elev 47 ft, 26 Sep 1988, Orzell & Bridges 8576 (SMU, TEX). Tyler Co: Intermediate depth flatwoods pond N of gravel rd, 3.9 mi W of TX 92 at a point 1 mi N of Fred, E of Drakes Branch and W of Spring Branch, Fred 7.5' Quad, 30°35'37" N, 94°13'55" W, elev 124 ft, 26 Sep 1988, Orzell & Bridges 8593 (SMU, TEX).

Our collections of this species are from open flatwoods ponds on the Beaumont, Montgomery and Bentley Formations (Quaternary). The soils of these sites are mapped as Typic Fragiqualfs and Typic Glossaqualfs. Frequent associates include *Aristida affinis*, *Bacopa caroliniana*, *Carex verrucosa*, *Cephalanthus occidentalis*, *Cyrilla racemiflora*, *Eriocaulon compressum*, *Gratiola brevifolia*, *Hydrolea ovata*, *Hypericum galioides*, *Juncus repens*, *Ludwigia sphaerocarpa*, *Myrica cerifera*, *Nyssa sylvatica* var. *biflora*, *Ozypolis filiformis*, *Panicum hemitomon*, *Pluchea rosea*, *Proserpinaca pectinata*, *Rhynchospora cephalantha*, *R. corniculata*, *R. filifolia*, *R. perpleza*, *Sphagnum macrophyllum*, *Styracis americana*, *X. lazifolia* var. *iridifolia*, *X. jupicai*, *X. fimbriata* and *X. smalliana*.

*Rhynchospora tracyi* ranges from South Carolina south to Florida and west to Mississippi (Godfrey & Wooten 1979) and in Cuba and the Bahamas (Correll & Correll 1982). It is one of the more semi-aquatic species of *Rhynchospora*, typically occurring in marshes, ponds, wet pinelands and cypress-gum depressions (Godfrey & Wooten 1979). In southwest Georgia it occurs in limesink depression ponds with many of the same associates as in Texas (Harper 1900, Lynch et al. 1986). The only Louisiana collection of *R. tracyi* was made by Cocks in the vicinity of Lake Charles (Cocks 1907; Joyce 1974). We have not been able to relocate this record despite searches of several flatwoods ponds north of Lake Charles.

*RUDBECKIA SCABRIFOLIA* L.E. Brown (Asteraceae). LA: Vernon Par: NEQ, SEQ, Sec 12, T1S, R8W, Large open hillside seepage bog known as "Cravens Bog," just NW of int FS Rds 405-1, 405, 445 and 408, Sugartown NW 7.5' Quad, 30°59'27" N, 93°08'10" W, Kisatchie NF, 14 Aug 1987, Orzell & Bridges 5734 (TEX); SEQ, NWQ, Sec 11, T1N, R11W, Small acid seep forest on N side LA 8, 1.5 mi E of int LA 111 at Burr Ferry, Burr Ferry 7.5'



Quad, 31°04'51" N, 93°27'53" W, 13 Aug 1987, Orzell & Bridges 5718 (TEX); NEQ, NWQ, Sec 32, T2N, R10W, Hillside seepage bog on W facing ravine slope on N side LA 8, opposite int Vernon Par Rd #15, 1.85 mi W of int LA 464, Burr Ferry 7.5' Quad, 31°06'47" N, 93°25'00" W, 13 Aug 1987, Orzell & Bridges 5720 (NLU), 11 Jun 1988, Orzell, Bridges, & P. Sheridan 7266 (SMU, TEX); Hillside seepage bog on E side of LA 464, 1.9 mi S of bridge over Wolf Creek, 2.5 mi S of Vernon Par Rd #25, 3.0 mi S of Vernon Par Rd #27, 5.5 mi S of LA 8, SH, SWQ, SWQ, Sec 21, T1N, R10W, Burr Ferry 7.5' Quad, 31°02'36" N, 93°24'08" W, elev 230-260 ft, 11 Jun 1988, Orzell, Bridges, & P. Sheridan 7262 (TEX). TX: Sabine Co: Lower slope hillside seepage bog in valley of Shingle Branch, 0.5 mi N of FS Rd 113, 0.5 mi E of TX 87, Sabine NF, Fairmount 7.5' Quad, 31°11'22" N, 93°43'14" W, elev 270 ft, 12 Aug 1987, Orzell & Bridges 5658 (SMU, TEX); Acid seep forest on S side of FS Rd 113, ca 0.6 mi SE of TX 87 at a point ca 1 mi S of int FM 3315 in Fairmount and 1.3 mi N of Newton Co line, E of Fox Hunters Hill, Sabine NF, Fairmount 7.5' Quad, 31°10'35" N, 93°43'27" W, elev 250-260 ft, 12 Aug 1987, Orzell & Bridges 5661 (TEX).

All of our collections of *Rudbeckia scabrifolia* are from hillside seepage bogs and the edges of acid seep forests adjacent to these bogs. In Louisiana it is found on the High Terraces (= Willis Formation, Quaternary) near the contact with underlying Miocene formations. All of the Texas sites are on the Catahoula Formation (Miocene), or near the contact of the Catahoula and Willis formations. Frequent associates include *Acer rubrum*, *Asclepias rubra*, *Carex glaucescens*, *Eriocaulon decangulare*, *Magnolia virginiana*, *Myrica heterophylla*, *Osmunda cinnamomea*, *Persea borbonia*, *Platanthera ciliaris*, *Rhus verniz*, *Rhynchospora chalarocephala*, *R. gracilentia*, *R. oligantha*, *Scleria reticularis*, *Smilax laurifolia*, *Viburnum nudum*, *Woodwardia virginica*, *Xyris ambigua* and *X. scabrifolia*.

*Rudbeckia scabrifolia* was described from three counties in southeastern Texas (Brown 1986a). Our collections add the above cited county and parish to its previous known range. *Rudbeckia scabrifolia* is a narrow endemic of limited geographic range in southeastern Texas (four adjacent counties) and Vernon Par in adjoining southwest Louisiana. Although locally abundant, it is fidel to hillside seepage bogs and associated broadleaf semi-evergreen acid seep forests on the Catahoula Formation (Miocene) and Willis Formation (Quaternary).

*RUDBECKIA SUBTOMENTOSA* Pursh (Asteraceae). TX: Angelina Co: Edges of acid seep forest at head of ravine, ca 0.3 mi W of FS Rd 302A, 1.1 mi S of FS Rd 302, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spr. 7.5' Quad, 31°04'37" N, 94°17'44" W, elev 220-250 ft, Geology - Catahoula Formation (Miocene). 20 Sep 1988, Orzell & Bridges 8342 (GA, MO, NCU, NY, SMU, TEX).

Our collection of *Rudbeckia subtomentosa* was under a canopy of *Liquidambar styraciflua*, *Magnolia virginiana* and *Pinus taeda*, on a slightly seepy lower slope at the ecotone between a hillside seepage bog, dry-mesic pine-hardwood

forest and acid seep forest. Associates included *Callicarpa americana*, *Carex glaucescens*, *Chionanthus virginicus*, *Eleocharis tortilis*, *Eryngium integrifolium*, *Gelsemium sempervirens*, *Helianthus angustifolius*, *Hyptis alata*, *Myrica cerifera*, *Osmunda cinnamomea*, *O. regalis*, *Persea borbonia* and *Solidago rugosa*.

*Rudbeckia subtomentosa* was listed by Correll & Correll (1975) as having been reported from and questionably occurring in Texas, however, they cite no source for this report. It was reported by Flook (1975) on the basis of a collection by Geraldine Watson from Hardin Co. It is listed from Hardin Co in an unpublished key to *Rudbeckia* in Texas (Brown 1986c). We are aware of no other reports of this species from Texas. It is fairly common throughout much of Louisiana and the Texas records represent a short westward range extension.

*RUDBECKIA TRILOBA* L. (Asteraceae). TX: San Augustine Co: On W side of gravel rd to Sunrise, 0.9 mi SE of TX 21 at a point 1.1 mi E of San Augustine, San Augustine East 7.5' Quad, 31°30'53" N, 94°05'07" W, 18 May 1988, Orzell & Bridges 6876 (MO, NY, SMU, TEX), 12 Jul 1988, Orzell 7360 (NCU, SMU, TEX). Additional collections: TX: Nacogdoches Co: ca 1.5 mi N of jct of Hwy 103 & 95 on 95, clayish soil, open roadside and adj forest, occasional, 7 May 1985, E.S. Nixon 15013 (SMU).

Our collections are from a sloping dry shrub thicket below an extensive Weches Formation (Claiborne group - Eocene) calcareous, glauconitic, ironstone glade-outcrop. *Rudbeckia triloba* grows with the woody species *Aesculus pavia*, *Cercis canadensis*, *Cornus drummondii*, *Rhamnus caroliniana*, *Crataegus* spp., *Forestiera ligustrina*, *Frazinus americana*, *Ilex decidua*, *Quercus muhlenbergii*, *Rhus copallina*, *R. glabra* and *Bumelia lanuginosa*. Herbaceous associates include the vernal ephemerals *Streptanthus maculatus*, *Allium drummondii*, *Anemone heterophylla*, *Arenaria patula*, *Astragalus nuttallianus*, *Valerianella radiata* and *Lesquerella pallida*. Other associates include *Carex amphibola*, *C. granularis*, *C. physorhyncha*, *C. retroflexa*, *C. willdenowii*, *Elymus virginicus*, *Geum canadense*, *Scutellaria cardiophylla*, *Smilax herbacea*, *Mirabilis albida*, *Ipomopsis rubra* and *Cuphea viscosissima*. The calciphilic flora of this site is extremely unusual for the Piney Woods region of east Texas and contains many disjunct and peripheral species.

*Rudbeckia triloba* was first reported for Texas by Taylor & Taylor (1981) from Lamar Co and is listed for Lamar Co in an unpublished key to *Rudbeckia* in Texas (Brown 1986c). It does occur in counties bordering Texas in southwestern Arkansas (Smith 1988) and southeastern Oklahoma (McGregor et al. 1977) and is known to occur west to Natchitoches, Lafayette and Iberia parishes in Louisiana. It likely occurs in some calcareous forests in the counties bordering the Red River, but is probably disjunct to the Weches Formation outcrops of Nacogdoches and San Augustine counties in southeast Texas.

*SCLERIA VERTICILLATA* Muhl. ex Willd. (Cyperaceae). LA: Calcasieu Par: NWQ, NWQ, Sec 31, T8S, R8W, Longleaf pine savannah on E side of N Perkins Ferry Rd, 1.8-2.0 mi N of jct LA 378, just S of power line, Moss Bluff

7.5' Quad, 30°19'42" N, 93°13'49" W, 17 Aug 1987, Orzell & Bridges 5759 (NLU, TEX).

*Scleria verticillata* was common on a roadside through a wetland longleaf pine savannah on the Prairie Terrace (Quaternary). Associated species included *Fuirena breviseta*, *Ludwigia microcarpa*, *Mitreola sessilifolia*, *Polygala leptocaulis*, *Rhynchospora colorata*, *R. divergens*, *R. perpleza* and *Xyris louisianica*.

Although wide ranging in temperate and tropical regions of the Western Hemisphere, this species seems to be extremely rare in the south central United States. Only one previous collection exists from Louisiana, according to Joyce (1974), without collector, number, or date, labeled only "Flora of Louisiana." It is known from one historical and one recent collection in Arkansas (Orzell et al. 1985) and is a rare disjunct restricted to marly areas in Missouri Ozark fens (Orzell 1984). It was reported as new to Oklahoma by Taylor & Taylor (1978), from a seepage saturated sapric coastal plain bog. *Scleria verticillata* is rare and local in Texas, occurring mostly in the central portion of the state. The nearest locality to Louisiana in Texas is from Marysee Prairie in Liberty Co (Nixon 15139, ASTC).

*SPIRANTHES PARKSII* Correll (Orchidaceae). Jasper Co: Small gravelly openings in Catahoula barrens woodland on NE side of TX 63, 100 yds S of int Post Oak Road, in upper reaches of Black Branch watershed and ca 1.0 mi N of int R 255, Ebenezer 7.5' Quad, Angelina NF, 28 Oct 1986, Orzell & Bridges 4854 (TEX).

At this site, *Spiranthes parksii* was rare, under a 50% canopy of *Quercus stellata* and *Carya texana*, in openings in a 30% cover shrub layer of *Vaccinium arboreum* and *Ilex vomitoria*. Herb layer associates include *Gelsemium sempervirens*, *Chasmanthium sessilifolium* and *Rhus copallina*, with 25% total cover.

*Spiranthes parksii* was previously thought to be restricted to a narrow band within the Post Oak Belt of east-central Texas, in Brazos, Grimes, Burleson and Robertson counties. Field work in 1986 and early 1987 has added Leon, Madison and Washington counties to its known range, with rosettes possibly representing this species observed in Lee Co (Kathy Jordan, pers. comm.). Our collection is well within the Piney Woods region of east Texas, and about 170 km east of all other known locations. Although well within humid east Texas, the unusual soil conditions at the site produce a vegetative physiognomy very similar to that at other *Spiranthes parksii* sites (see Catling & McIntosh 1979). The soil is the Browndell rock outcrop complex (clayey, montmorillonitic, thermic, shallow, Albaquic Hapludalfs), and is developed on flat to slightly sloping exposures of the tuffaceous sandstone member of the Catahoula formation (Miocene) (Neitsch 1982). These areas support many other species more characteristic of east central Texas. The vegetation of our collection site has been described by Marietta & Nixon (1983). The occurrence of *Spiranthes parksii* in Jasper Co implies that the intervening counties westward to Grimes Co which



have outcrops of the Catahoula Formation are within the potential range of this species. In addition, our cursory observations indicate potentially suitable habitat as far southwest as Colorado and Fayette counties. Extensive searches are needed and are now being implemented, rather than the previous intensive searches of small areas in order to fully document the occurrence and status of this federally listed endangered species.

*STYRAX GRANDIFOLIA* Ait. (Styracaceae). TX: Angelina Co: Gonsoulin 1007 (SMU). Hardin Co: V.L. Cory 52817 (SMU, TAES), Cory 52764 (SMU), E. Whitehouse 23099 (SMU), Mrs. J.L. Hooks s.n. (TEX), E. Whitehouse s.n. (TEX). Jasper Co: Paul Cox 132 (ASTC), Correll & Correll 27230 (SMU), Lundell & Lundell 11193 (LL, TEX), Lundell 11855 (LL, TEX), Lundell 11825 (LL), Correll 27425 (LL), Correll & Correll 27230, 29106 (LL). Liberty Co: Gonsoulin 1036 (SMU). Newton Co: Nizon & Ward 12893, 12925 (ASTC), Nizon & Goodheart 8369 (ASTC), Peterson, Nizon, & Marietta 8288, 8292 (ASTC), C.D. Peterson s.n. (SBSC), S.H. Harris s.n. (SBSC), H.B. Parks s.n. (TAES), G. Watson 1660, 1825 (LAMA), R. Darville 88 (LAMA), Cory 52647 (SMU), Correll & Correll 12582 (LL, SMU), H. Nogle s.n. (SMU, TEX), Correll, Johnston, & Edwin 22274 (LL), Correll et al. 29640 (LL). Sabine Co: Orzell & Bridges 4353 (MO, SMU, TEX), Orzell & Bridges 6194 (NCU, NLU, SMU, TEX), Nizon & Ward 10661 (ASTC), Judy Teague 14 (ASTC), Nizon 14516, 15120 (ASTC), Nizon & Marietta 8183 (ASTC), L. Brown 9388 (SBSC). San Augustine Co: Orzell & Bridges 5115 (TEX). Shelby Co: Orzell & Bridges 5117 (TEX). Smith Co: Gonsoulin 1006 (SMU). Tyler Co: Orzell & Bridges 8718 (TEX), Nizon 14581 (ASTC), R.A. Vines s.n. (SBSC), R. Murphy 25 (LAMA), R. Rangel 54 (LAMA).

While working in southeast Texas, we noticed an unusual discrepancy in documentation of the occurrence of *Styrax grandifolia*, a fairly common species in the region. *Styrax grandifolia* is rarely recognized as occurring in Texas by in-state sources, although it has long been documented for Texas in the general literature. Correll & Johnston (1970) list *Styrax americana* as the only species of this genus in eastern Texas. Mears (1972) apparently first recognized the occurrence of *Styrax grandifolia* in Texas. Gonsoulin (1974) reported this species from six contiguous counties in southeast Texas. Material of *S. grandifolia* annotated by Gonsoulin at SMU and TEX had previously been misidentified as either *Halesia diptera*, *S. americana* or *S. platanifolia*, the latter species endemic to the Edwards Plateau of central Texas. No material at ASTC, LAMA, LL, SBSC, TAES, or TAMU bore Gonsoulin annotations. Little (1977), Elias (1980) and Duncan & Duncan (1988) map *Styrax grandifolia* for eastern Texas, giving a state range similar to Gonsoulin (1974). Despite such documentation of this large showy shrub or small tree in the state, it is not mentioned in Vines (1977), Ajilvsgi (1979), Watson (1982), Nixon (1985), or Cox & Leslie (1988). In May of 1985, we saw a specimen of *S. grandifolia* sent for exchange from ASTC to DUR which was misidentified as *S. americana*. In May of 1986, after having collected *S. grandifolia* in Texas, we examined the Styracaceae

at ASTC. We found 14 collections of *Styrax grandifolia*, originally identified as *S. americana* and annotated as *S. grandifolia* in October 1985. In addition, we found two other sheets of *S. grandifolia* which were misidentified as *S. americana* and one misidentified as *Halesia diptera*. In order to better understand the distribution of this overlooked species in Texas, we also examined all specimens of the Styracaceae at LL, SBSC, SMU, TAES, TAMU, TEX and Lamar University. We found that most specimens of *S. grandifolia* at these institutions were misidentified as *S. americana* or *Halesia diptera*.

In the interests of brevity, full specimen citations are not given, but only county, collector and number and place of deposit, in order to document collections of *S. grandifolia* determined or verified by the authors. Some additional citations of Texas material in other herbaria are given in Gonsoulin (1974), but these include no additional county records. With the exception of the Smith Co record, the entire distribution of this species in Texas is within the "Big Thicket" region of southeastern Texas. This area basically correlates with the Longleaf Pine Belt in Texas and corresponds rather closely to the distribution of several other mesic forest species in the state, notably *Fagus grandifolia*. In southeast Texas, *Styrax grandifolia* is most commonly found in mesic hardwood forests, typically dominated by some combination of *Fagus grandifolia*, *Magnolia grandiflora*, *Frazinus americana*, *Quercus alba*, *Q. laurifolia*, *Q. nigra*, *Q. shumardii*, *Carya cordiformis*, *C. ovata* and *C. tomentosa*. Topographically, these forests occupy mesic ravines and protected slopes or well drained stream terraces. *Styrax grandifolia* is always ecologically separated from *S. americana*, which prefers poorly drained shallow ponds and bottomland forests, seepage areas, or swamps. The two are occasionally found in rather close proximity in areas with great variation in hydrology, as with natural levees and ridges in floodplains or strongly sloping ravines with poorly drained bottoms. However, their habitat separation is always maintained. Our collections have added only San Augustine and Shelby counties to the Texas range of this species. It is possible that diligent collecting in such counties as Nacogdoches, Cherokee and Rusk could close the gap between the southeast Texas range and the Smith Co record. However, the general absence of many mesic forest species, particularly those which are rather infrequent in the state (i.e. *Sanguinaria canadensis*, *Thelypteris hexagonoptera*, *Hamamelis virginiana*, *Lindera benzoin* and *Uvularia perfoliata*) from northeast and north central Texas indicates that *Styrax grandifolia* may also be truly rare or absent from northeastern Texas. Its mesic hardwood forest habitat is becoming increasingly rare due to intensive cultivation of loblolly and slash pine over most of its potential habitat in the state. While not yet threatened with extirpation, it should be sought in additional counties in Texas.

*THASPIUM BARBINODE* (Michx.) Nutt. (Apiaceae). TX: Houston Co: Dry-mesic slope forest along trail E of Neches Bluff Overlook at N end of FS Rd 511-A, ca 0.9 mi E of TX 21, along steep N facing slope above the Neches River, Davy Crockett NF, Weches 7.5' Quad, 31°34'05" N, 95°09'35" W, elev

230-350 ft, Geology - Weches Formation (Eocene) below Sparta Sand, 20 Apr 1988, Orzell & Bridges 6417 (MO, SMU, TEX).

*Thaspium barbinode* was occasional under a canopy of *Pinus taeda* and an understory of *Acer barbatum*, *A. rubrum*, *Carya tomentosa*, *Quercus falcata*, *Q. velutina*, *Q. alba*, *Q. michauxii*, *Ostrya virginiana*, *Cornus florida*, *Ilex opaca*, *Frazinus americana* and *Liquidambar styraciflua*. The site has been subject to frequent hardwood suppression and prescribed burning and has little shrub or herb cover and diversity. Associates include a few individuals of *Carex oxylepis*, *C. caroliniana*, *C. amphibola*, *C. cephalophora*, *C. physorhyncha*, *Polystichum acrostichoides*, *Senecio obovatus*, *Silene stellata*, *Podophyllum peltatum*, *Phryma leptostachya*, *Thalictrum dasycarpum* and *Woodsia obtusa*.

To our knowledge, the nearest locations of this species to Texas are in the Ouachita Mountains of McCurtain Co, Oklahoma and in deep ravines west of the Ouachita River in Caldwell Par, Louisiana. It is considered rare in northern Louisiana (Marx & Thomas 1975). *Thaspium barbinode* seems to be infrequent and somewhat calciphilic on the Gulf Coastal Plain. It reaches its southeastern limit in the Oligocene limestone region of southwestern Georgia (Thorne 1954, Lynch et al. 1986) and Jackson Co, Florida (Mitchell 1962). The Texas locality is disjunct about 300 km south and 300 km west from the nearest reported stations for this species.

*THASPIUM TRIFOLIATUM* (L.) Gray (Apiaceae). TX: Nacogdoches Co: Dry-mesic calcareous forest ca 0.3 mi W of FM 255, 0.7 mi N of int TX 204 at Cushing, on smaller knob SE of Button Mountain, Cushing 7.5' Quad, 31°49'45" N, 94°50'47" W, elev 600-720 ft, 14 Apr 1988, Orzell & Bridges 6277 (MO, SMU, TEX). Sabine Co: Mesic sandy ravine forest along tributary of Colorow Creek, ca 0.3 mi N of FS Rd 108 and 2 mi E of Black Ankle, ca 5 air miles NW of Geneva, Sabine NF, Patroon South 7.5' Quad, 31°32'15" N, 93°57'53" W, elev 330-450 ft, 20 Apr 1987, Orzell & Bridges 5096 (MO, SMU, TEX). Tyler Co: Mesic calcareous forest ca 3.7 mi NE of Spurger, in deep ravine on W side of Neches River, Spurger 7.5' Quad, 30°44'10" N, 94°08'38" W, elev 75-125 ft, 23 Sep 1986, Orzell & Bridges 4801 (TEX). Additional collections: Hardin Co: Turkey Creek Unit, SE section, floodplain, 2 May 1978, G. Watson 2610 (LAMA). Sabine Co: Just SW of the jct of Hwy 87 and Colorow Creek, wooded mesic creek bottom and adjacent slopes, 3 Apr 1986, E.S. Nixon 15181 (SMU) (Det: B.L. Lipscomb, Jul 1986). San Jacinto Co: Big Thicket Scenic Area, along Little Creek, near Cold Spring, near *Trillium* on forest floor along Little Creek, sandy soil, high leaf litter, 26 Apr 1970, C.A. Ketchersid 172 (TAMU).

In Tyler Co, this species is occasional in a mesic forest developed on calcareous clays of the escarpment of the Fleming Formation (Miocene). In Nacogdoches and Sabine counties, it occurs in hardwood forests near the contact of sandy and calcareous Eocene strata. Canopy tree associates at two or more sites include *Fagus grandifolia*, *Quercus alba*, *Q. shumardii*, *Carya tomentosa*,



*Celtis laevigata*, *Frazinus americana*, *Liquidambar styraciflua* and *Tilia americana*. Understory trees include *Ostrya virginiana*, *Cornus florida*, *Sassafras albidum*, *Symplocos tinctoria* and *Cercis canadensis*. Shrub and herb associates include *Smilax pumila*, *Arisaema triphyllum*, *Asimina parviflora*, *Lindera benzoin*, *Mitchella repens*, *Oplismenus setarius*, *Parthenocissus quinquefolia*, *Podophyllum peltatum*, *Polystichum acrostichoides*, *Solidago auriculata*, *Tradescantia hirsutiflora* and *Viburnum acerifolium*.

*Thaspium trifoliatum* was reported as new to Texas by Brown (1986b) on the basis of a specimen (McFarlane 30) from Liberty Co. Previous to the publication of this record we had collected *T. trifoliatum* in Tyler Co and in examining collections of *Thaspium* and *Zizia* at Texas herbaria uncovered three additional collections, two of which had been misidentified as *Z. aurea*. Therefore, *T. trifoliatum* is now documented from six southeast Texas counties. *Thaspium trifoliatum* is a relatively common herb of mesic mixed hardwood forests in the eastern United States, ranging from Florida and Louisiana north to New York and South Dakota. Previous to these reports, its western limit was from Louisiana north to the Interior Highlands of Arkansas and eastern Oklahoma.

*UVULARIA PERFOLIATA* L. (Liliaceae). TX: Sabine Co: Mesic sandy ravine forest along tributary of Colorow Creek, ca 0.3 mi N of FS Rd 108 and 2 mi E of Black Ankle, ca 5 air miles NW of Geneva, Sabine NF, Patroon South 7.5' Quad, 31°32'15" N, 93°57'53" W, elev 330-450 ft, 5 Aug 1986, Orzell & Bridges 4652 (TEX); Mesic ravine forest in upper reaches of valley of Dorsey Branch, on N side of FR 276 extension, ca 0.4-1.0 mi W of TX 87 at Isla, 5.2 mi N of Milam, East Hamilton 7.5' Quad, 31°30'07" N, 93°51'28" W, elev 300-520 ft, 30 Mar 1987, Orzell & Bridges 4960 (SMU, TEX); Mesic, partially calcareous, ravine forests in upper reaches of Colorow Creek, N of FS Rd 198, on W side of FM 330 from 3-3.5 mi N of Geneva, Colorow Creek Scenic Area, Sabine NF, Patroon South 7.5' Quad, 31°31'14" N, 93°55'42" W, elev 310-500 ft, 30 Mar 1987, Orzell & Bridges 4965 (MO, TEX); Mesic ravine forests along upper reaches of Mason Creek, on NW side of Sabine Co Rd #37, ca 1 mi W of TX 87, ca 4.5 mi N of Milam, Sabine NF, Milam 7.5' Quad, 31°29'33" N, 93°51'10" W, elev 300-400 ft, 12 Apr 1988, Orzell & Bridges 6190 (TEX); Mesic ravine forests N of Bennetts Cem, NE of N end of FS Rd 121, along shore of Toledo Bend Res, just S of Shelby Co line, Sabine NF, East Hamilton 7.5' Quad, 31°35'00" N, 93°50'10" W, elev 170-240 ft, 12 Apr 1988, Orzell & Bridges 6201 (GA, NCU, SMU, TEX). Additional collections: Sabine Co: 4.1 mi E of Geneva, on dirt road, mesic wooded creek bottom and slope, occasional clumps, 22 Mar 1985, E.S. Nixon 14347 (ASTC, SMU); Common at edge of small stream in a deep ravine along gravel road ca 4.5 mi NE of Geneva, rd extends between Hwy 21 & 87 in Sabine NF, beech-maple forest, 6 Apr 1985, L.E. Brown 8615 (SBSC).

*Uvularia perfoliata* is occasional in mesic mixed hardwood forests in deep ravines transecting both sandy and calcareous Eocene strata. Frequent canopy

trees include *Fagus grandifolia*, *Acer rubrum*, *Carya tomentosa*, *Celtis laevigata*, *Frazinus americana*, *Liquidambar styraciflua*, *Magnolia grandiflora*, *Nyssa sylvatica*, *Pinus taeda*, *Prunus serotina*, *Quercus alba*, *Q. falcata*, *Q. michauxii*, *Q. shumardii* and *Tilia americana*. Understory trees include *Acer barbatum*, *A. leucoderme*, *Aralia spinosa*, *Cercis canadensis*, *Chionanthus virginicus*, *Cornus florida*, *Hamamelis virginiana*, *Ilex opaca* and *Ostrya virginiana*. Shrub and herb associates include *Arisaema triphyllum*, *Aristolochia serpentaria*, *Arundinaria gigantea*, *Athyrium felix-femina*, *Callicarpa americana*, *Carex digitalis*, *C. ozylepis*, *C. striatula*, *C. willdenowii*, *Clematis virginiana*, *Cynoglossum virginianum*, *Dioscorea villosa*, *Epifagus virginiana*, *Erythronium rostratum*, *Ilex longipes*, *Lathyrus venosus*, *Lilium michauxii*, *Listera australis*, *Luzula echinata*, *Melica mutica*, *Mitchella repens*, *Parthenocissus quinquefolia*, *Pedicularis canadensis*, *Phlox pilosa*, *Poa autumnalis*, *Podophyllum peltatum*, *Polystichum acrostichoides*, *Rhus radicans*, *Salvia lyrata*, *Sanicula gregaria*, *Scleria triglomerata*, *Smilax pumila*, *Solidago auriculata*, *S. caesia*, *Spigelia marilandica*, *Styrax grandifolia*, *Thelypteris hexagonoptera*, *Tipularia discolor*, *Tradescantia hirsutiflora*, *Trillium gracile*, *Viburnum acerifolium*, *V. dentatum*, *Viola lovelliana*, *V. missouriensis*, *V. walteri*, and *Vitis rotundifolia*.

*Uvularia perfoliata* is commonly found in mesic forests of the extreme eastern United States, extending westward on the Gulf Coastal Plain to north-central Louisiana and with disjunct localities in the Ouachita Mountains of Arkansas where it occurs in acid seep forests (Orzell 1985). In Texas, it occurs with several other species which are uncommon in the state, including *Dentaria laciniata*, *Sanguinaria canadensis*, *Cypripedium kentuckiense* and several above mentioned associates. The significance in east Texas and northern Louisiana of several species associated with *Uvularia perfoliata* was described by Kral (1966c), who offers quite probable hypotheses concerning the persistence of northern woodland elements in deep ravine forests of the lower Gulf Coastal Plain. *Uvularia perfoliata* and many of its Texas associates are also found in the geologically contemporaneous Eocene Red Hills Belt of Georgia, another area noted for its rich flora of more inland species on the Coastal Plain (Thorne 1949). Nixon & Damuth (1987) reported *Uvularia perfoliata* from a single Sabine Co site. Our five locations in Sabine Co are fairly continuous with the nearest records in DeSoto and Natchitoches parishes, Louisiana.

*XYRIS DRUMMONDII* Malme (Xyridaceae). LA: Beauregard Par: High hillside seepage bog on S facing slope below timber road, ca 3 mi E and 1.2 mi N of Merryville, 0.3 mi N of railroad and S of Bridge Creek, center of NH, SWQ, Sec 28, T3S, R11W, Merryville North 7.5' Quad, 30°46'17" N, 93°30'01" W, elev 130-140 ft, 11 Jun 1988, Orzell, Bridges, & P. Sheridan 7241 (TEX), 26 Jul 1988, Orzell & Bridges 7478 (MO, NCU, NLU, TEX, VDB); Low hillside seepage bog on N side of Memorial Church Rd, 2.2 mi E of US 190-171 at a point 3.1 mi N of int LA 110 at Longville and 9.6 mi S of LA 394 S of DeRidder, NWQ, NWQ, Sec 9, T5S, R8W, Redhead Branch 7.5' Quad, 30°38'58" N, 93°11'54" W, elev 100-110 ft, 11 Jun 1988, Orzell, Bridges & P.

*Sheridan 7252* (TEX), 27 Jul 1988, *Orzell & Bridges 7499* (NLU, SMU, TEX); Open burned seepage bog in longleaf pine savannah on E side US 190 & 171, 4.0 mi S of int LA 394, 0.7 mi S of int Lumas Rd, ca 9 mi S of DeRidder, EH, SEQ, Sec 12, T4S, R9W, Redhead Branch 7.5' Quad, 30°43'43" N, 93°14'09" W, elev 145-155 ft, 27 Jul 1988, *Orzell & Bridges 7528* (NLU, TEX). Vernon Par: NEQ, SEQ, Sec 12, T1S, R8W, Common in large open hillside seepage bog just NW of int FS Rds 405-1, 405, 445 and 408, in area known as "Cravens Bog," Sugartown NW 7.5' Quad, 30°59'27" N, 93°08'10" W, Kisatchie NF, 14 Aug 1987, *Orzell & Bridges 5740* (NLU, TEX). TX: Angelina Co: Upper slope hillside seepage bog SW of FS Rd 330 (closed), ca 1 mi S of FS Rd 338, on SW facing slope, Boykin Spring 7.5' Quad, 31°03'47" N, 94°21'13" W, Angelina NF, Upland Island WA, 11 Aug 1987, *Orzell & Bridges 5620* (TEX); Upper slope hillside seepage bog SW of FS Rd 330 (closed), ca 1 mi S of FS Rd 338, on NW facing slope, Boykin Spring 7.5' Quad, 31°03'47" N, 94°21'10" W, Angelina NF, Upland Island WA, 11 Aug 1987, *Orzell & Bridges 5625* (SMU, TEX, VDB); Occasional on exposed peaty sands with copious seepage in strongly sloping (40%), actively slumping hillside seepage bog, N of FS Rd 314, 1.7 mi E of jct US 69, on S facing slope, Boykin Spring 7.5' Quad, Upland Island WA, Angelina NF, 24 Jul 1986, *Orzell & Bridges 4502* (NCU, SMU, TEX); Steep (30-40%) upper slope hillside seepage bog 0.7 mi N of FS Rd 314, ca 1.7 mi E of US 69, SE of FS Rd 328A (closed), Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°03'30" N, 94°22'12" W, elev 240-250 ft, 16 Sep 1986, *Orzell & Bridges 4739* (SMU, TEX); Upper slope hillside seepage bog 0.4 mi W of FS Rd 302A, ca 1.2 mi S of FS Rd 302, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'32" N, 94°17'45" W, elev 200-220 ft, 20 Sep 1988, *Orzell & Bridges 8343* (SMU, TEX); Upper slope hillside seepage bog W of FS Rd 302A, ca 1.5 mi S of FS Rd 302, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'12" N, 94°17'30" W, elev 210-220 ft, 20 Sep 1988, *Orzell & Bridges 8352* (TEX); Upper slope hillside seepage bog 0.4 air mi W of FS Rd 302A at a point ca 1.3 mi S of FS Rd 302, ca 0.6 air mi N of Jasper Co line, on slope N of tributary to Big Creek, ca 10 mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'20" N, 94°17'45" W, elev 210-240 ft, 26 Aug 1988, *Orzell & Bridges 8325* (TEX). Jasper Co: Lower slope hillside seepage bog ca 1.5 mi SW of Harveytown (Letney), ca 2 mi NNW of Ebenezer, Angelina NF, Ebenezer 7.5' Quad, 31°03'54" N, 94°10'06" W, 12 Aug 1987, *Orzell & Bridges 5677* (GA, SMU, TEX); Common in areas of copious seepage and on roadside cut through seepage bog on N side FS Rd 314, 3.9 mi E of US 69, 0.2 mi W of int FS Rd 330, Boykin Spring 7.5' Quad, 18 Jun 1986, *Orzell & Bridges 4345* (MO, SMU, TEX), 24 Jul 1986, *Orzell & Bridges 4519* (ASTC, GA, NCU, SMU, TAMU, TEX, VDB); Occasional on saturated sand on S side of eroded roadbed crossing of hillside seepage bog on E side of Millstead Branch, W of Boykin Spring Recreation Area, Boykin Spring 7.5' Quad, Angelina NF, 24 Jul 1986, *Orzell & Bridges 4522* (SMU, TEX);



Occasional in numerous hillside seepage bogs within pipeline right-of-way SW of R255, just E of Rayburn Country, McGee Bend 7.5' Quad, 25 Jul 1986, *Orzell & Bridges 4527* (NY, SMU, TEX); Common on exposed seepage saturated sand in upper steep slope hillside seepage bog with sandstone outcrops on tributary of Rock Creek, ca 4 mi E of Browndell (E on FM 1007 for 1.8 mi, then left fork 1.3 mi, right fork 0.2 mi, & left fork 0.4 mi), on property of Mr. Paul Grubbs, Little Rocky Nature Preserve, Harrisburg 7.5' Quad, 31°06'45" N, 93°55'48" W, elev 280-310 ft, 6 Aug 1986, *Orzell & Bridges 4673* (TEX); Upper slope hillside seepage bog ESE of FS Rd 313A, ca 1.4 mi W of FS Rd 313, on slopes above unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'09" N, 94°16'49" W, elev 230-250 ft, 13 Jul 1988, *Orzell 7390* (TEX), 26 Aug 1988, *Orzell & Bridges 8280* (MO, NCU, SMU, TEX, VDB). Newton Co: Lower slope hillside seepage bogs in grazed and periodically burned slash pine plantation (ca 20 years old) on E side of East Prong McKim Creek and W of gravel rd, from 1.5-1.7 mi N of county road int at BM 532 on topo, 31°06'24" N, 93°53'24" W, Harrisburg 7.5' Quad, 13 Aug 1987, *Orzell & Bridges 5687* (SMU, TEX); Extensive high hillside seepage bog, frequently burned, along SW facing slope along tributary to Wet Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'15" N, 93°48'07" W, 13 Aug 1987, *Orzell & Bridges 5701* (SMU, TEX); Upper slope hillside seepage bog on W to SW facing slope along Dry Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'00" N, 93°48'43" W, 13 Aug 1987, *Orzell & Bridges 5703* (TEX). Additional collections: TX: Jasper Co: Hillside seepage area along FR 314 ca 0.5 mile west of intersection with FR 330 in the Angelina NF, 16 Aug 1986, *L.E. Brown 10645*, in part (SBSC) (mostly *X. difformis* var. *curtissii* with one plant of *X. drummondii*, det. E.L. Bridges, Feb 1987.

*Xyris drummondii* is most often found in hillside seepage bogs where seepage has created exposures of wet fine sand (Kral 1983) or peaty sand. The Texas sites are exclusively on the Catahoula Formation (Miocene), in hillside seepage bogs formed where groundwater emerges from a sandy residuum at its contact with an impervious layer of tuffaceous sandstone or siltstone. The Louisiana sites reported are from seepage bogs formed at the contact of the Willis and Bentley Formations (Quaternary) with underlying strata or stream valleys. Species most frequently (at at least five of the sites reported) closely associated with *X. drummondii* are *Burmanna capitata*, *Drosera capillaris*, *Eriocaulon texense*, *Lycopodium appressum*, *L. carolinianum*, *Marshallia tenuifolia*, *Polygala ramosa*, *Rhynchospora gracilentia*, *R. oligantha*, *Sarracenia alata*, *Xyris baldwiniana* and *X. difformis* var. *curtissii*. This small, distinctive *Xyris* was as recently as 1956 known only from the type locality. The intensive collecting of Kral (1960, 1966b, 1966c) resulted in many additional localities for *X. drummondii*, mostly in a narrow band along the central Gulf Coast from Tallahassee, Florida to Gulfport, Mississippi, with an outlying station in southeastern Georgia. Since then, *X. drummondii* has been found in a hillside

seepage bog on the Catahoula Formation in Natchitoches Par, Louisiana, disjunct from southern Mississippi (Kral 1983). Our collections add Vernon and Beauregard parishes to the Louisiana range. Our Texas collections and the L.E. Brown collection uncovered in our examination of Texas *Xyris* extend the West Gulf Coastal Plain disjunct range for the species westward around 120 km into southeast Texas and 470 km from the main range in the East Gulf Coastal Plain. Kral (1966) considers *X. drummondii* to be "most commonly a part of the hillside bogs so common to the rolling, longleaf pine country of northwest Florida above the lowest terraces." The West Gulf Coastal Plain sites also fit this landscape description.

Several other species of *Xyris* also occur in hillside seepage bogs in Louisiana and Texas, but usually with some microhabitat separation. *Xyris ambigua* is the most conspicuous and widespread *Xyris* in these sites, occurring throughout the graminoid matrix. *Xyris scabrifolia* occurs both in seepage areas and in partial shade near the downslope edges of bogs. *Xyris difformis* var. *curtissii*, although present in smaller numbers under the taller graminoids, is more common and evident in the finer growth of *Rhynchospora oligantha* characteristic in areas of emerging seepage. *Xyris baldwiniana* is also common in these seepage areas, becoming abundant on exposed saturated sands. *Xyris drummondii* seems to be the most seepage dependent of these *Xyris* species. Under natural conditions, *X. drummondii* occurs only where nearly constant seepage results in substrate saturation and instability, with much exposed soil surface and generally short (less than 10 cm tall) vegetation. We have found this species both in natural occurrences of this habitat and where disturbances such as soil surface scraping has removed the denser graminoid cover in road and pipeline right-of-way crossings of copious seepage areas. In these cases, the source of the seepage must not be altered, as *X. drummondii* seems to require a constantly saturated substrate not subject to flooding and supporting little other vegetation. Of the other species of *Xyris* in Texas, we have found only three others in these hillside bogs, *Xyris platylepis* and *X. torta* are rare in only a few locations and *X. jupicai* is found in disturbed areas, particularly where sheet wash has occurred.

*XYRIS FIMBRIATA* Ell. (Xyridaceae). LA: Calcasieu Par: SWQ, Sec 35, T8S, R9W, Deep open flatwoods ponds on S side of Cypress Lake Dr, from 0.1-0.4 mi W of Sutherland Rd, ca 1 mi N of end of LA Spur 378, Buhler 7.5' Quad, 30°19'13" N, 93°15'45" W, 25 Jul 1988, Orzell & Bridges 7407 (NLU, TEX). TX: Hardin Co: Large graminoid dominated flatwoods pond on NW side of logging rd at BM 88 on topo, ca 0.5 mi S of Beaumont Creek, 3.2 mi N of FM 418, Kountze North 7.5' Quad, 30°25'30" N, 94°18'45" W, 18 Aug 1987, Orzell, Bridges, & G. Watson 5778 (ASTC, DUKE, FLAS, FSU, GA, GH, LSU, MISSA, MO, NCU, NLU, NY, PH, SBSC, SMU, TAES, TAMU, TENN, TEX, US, VDB + 5 sheets); Large graminoid dominated flatwoods pond 0.3 mi S of dirt rd, 2.1 mi E of end of FR 420, 5.8 mi E of US 69, Kountze North 7.5' Quad, 30°26'56" N, 94°18'53" W, 25 Sep 1987, Orzell & Bridges 5805

(GA, NCU, SMU, TEX, VDB); Open blackwater sloughs in sandhills ca 0.5 mi N of Village Creek and 1 mi NE of FR 420, near McNeely Lake, Kountze North 7.5' Quad, 30°28'12" N, 94°18'55" W, 18 Aug 1987, *Orzell & Bridges*, & *G. Watson* 5775 (MO, NCU, SMU, TEX, VDB); Common in graminoid dominated shallow wind deflation pond on an interstream sand ridge ca 1.5 mi SW of TX 418 and FM 1122, ca 0.6 mi S of TX 418 and 0.4 mi N of AT & SF railroad, Deserter Baygall 7.5' Quad, 19 Sep 1986, *Orzell, Bridges, & G. Watson* 4764 (ASTC, FLAS, FSU, LSU, MO, NCU, NLU, SMU, TAES, TEX, VDB); Deep, peat based pond on riverine sand ridge on N side of railroad, ca 0.5 mi E of Village Creek and 0.8 mi S of FM 418, ca 4 mi E of Kountze, Alligator Grass Lake, Roy E. Larsen Sandylands Sanctuary, Kountze North 7.5' Quad, 30°23'02" N, 94°15'20" W, elev 48 ft, 23 Aug 1988, *Orzell & Bridges* 8199 (SMU, TEX). Jasper Co: Large open graminoid dominated flatwoods pond N of dirt road, 2.4 mi E of LeVerte, 2.9 mi E of US 96, 7 mi N of TX 62 at Buna, Call Junction 7.5' Quad, 30°32'00" N, 94°54'00" W, 15 Oct 1987, *Orzell & Bridges* 5926 (NCU, SMU, TEX), 23 Aug 1988, *Orzell & Bridges* 8175 (DUKE, FSU, GA, MO, NCU, SMU, TEX, VDB). Newton Co: Intermediate to deep open flatwoods ponds in pine plantations, N of TX 253 on gravel rd 2.6 mi W of jct TX 87, Sudduth Bluff 7.5' Quad, 30°25'50" N, 93°50'40" W, elev 47 ft, 26 Sep 1988, *Orzell & Bridges* 8569 (NCU, SMU, TEX, VDB). Tyler Co: Intermediate depth flatwoods pond N of gravel rd, 3.9 mi W of TX 92 at a point 1 mi N of Fred, E of Drakes Branch and W of Spring Branch, Fred 7.5' Quad, 30°35'37" N, 94°13'55" W, elev 124 ft, 26 Sep 1988, *Orzell & Bridges* 8590 (DUKE, MO, NCU, NLU, SMU, TEX, VDB). Additional collections: TX: Hardin Co: Sandylands Preserve, TNC, 3 km W of Silsbee, pond, 25 Sep 1982, *Matos & Rudolph* 969 (ASTC); Sandylands Preserve, TNC, 3 km W of Silsbee, Area 4, *Sphagnum* bog, Comm 4, 3 Oct 1982, *Matos et al.* 1049 (ASTC).

*Xyris fimbriata* is found in open, graminoid dominated flatwoods ponds on the Beaumont, Montgomery and Bentley Formations (Quaternary). The soils of these sites are mapped as Typic Fragiaqualfs and Typic Glossaqualfs, although histic soils occur at some sites. Frequent associates include *Aristida affinis*, *Bacopa caroliniana*, *Carex verrucosa*, *Centella asiatica*, *Cephalanthus occidentalis*, *Cyrtilla racemiflora*, *Eleocharis equisetoides*, *E. tuberculosa*, *Eriocaulon compressum*, *Fuirena breviseta*, *Gratiola brevifolia*, *Hydrolea ovata*, *Hypericum galioides*, *Juncus repens*, *Ludwigia sphaerocarpa*, *Lycopodium appressum*, *Myrica cerifera*, *Nymphaea odorata*, *Nyssa sylvatica* var. *biflora*, *Ozypolis filiformis*, *Panicum hemitomon*, *Pluchea rosea*, *Proserpinaca pectinata*, *Rhynchospora cephalantha*, *R. corniculata*, *R. filifolia*, *R. latifolia*, *R. perpleza*, *R. tracyi*, *Scleria baldwinii*, *Sphagnum macrophyllum*, *Styrax americana*, *Utricularia gibba*, *Xyris iridifolia* and *X. smalliana*.

*Xyris fimbriata* is one of the tallest and most semi-aquatic of all United States *Xyris* species, preferring cypress domes, gum swamps and flatwoods ponds through much of its range (Kral 1960, 1966b). It is found primarily



on the south Atlantic and East Gulf Coastal Plain from southeast Virginia to central Florida and west to southern Mississippi (Kral 1966b). The first Louisiana report was by Thieret (1967) from St. Tammany Par and our collection is the second parish record for this species. Disjunct populations also occur in the New Jersey pine barrens and in flatwoods ponds in the Ridge and Valley Province of Georgia and Alabama and the Eastern Highland Rim of Tennessee. The cited collections are apparently the first for the West Gulf Coastal Plain and disjunct over 400 km from the nearest locations in southeast Louisiana. The ASTC specimens had been misidentified as other *Xyris* species until our annotation.

*XYRIS PLATYLEPIS* Chapm. (Xyridaceae). LA: Beauregard Par: High hillside seepage bogs in longleaf pine savannah on timber roads ca 3 mi E and 1.2 mi N of Merryville, N of railroad and S of Bridge Creek, SH, NWQ, Sec 28, T3S, R11W, Merryville North 7.5' Quad, 30°46'31" N, 93°30'05" W, elev 120-150 ft, 11 Jun 1988, *Orzell, Bridges, & P. Sheridan 7240* (TEX). Vernon Par: Large open hillside seepage bog just NW of int FS Rds 405-1, 405, 445, and 408, ca 10 mi SE of Pickering and 10 mi WNW of Cravens, in area known as "Cravens Bog," Kisatchie NF, NEQ, SEQ, Sec 12, T1S, R8W, Sugartown NW 7.5' Quad, 30°59'27" N, 93°08'10" W, elev 220-250 ft, 14 Aug 1987, *Orzell & Bridges 5735* (NLU, SMU, TEX), *Orzell & Bridges 5739* (TEX). TX: Jasper Co: Rocky spring fed margins of Hog Creek, upstream (E) of main logging rd and N of pipeline crossing, ca 2.5 mi S of R255 at Rayburn Country, ca 10 mi NW of Jasper, McGee Bend 7.5' Quad, 31°02'08" N, 94°03'16" W, elev 160-200 ft, 22 Aug 1988, *Orzell & Bridges 8144* (NCU, SMU, TEX, VDB). Newton Co: Sandy wet stream bank along intermittent tributary of South Prong Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'37" N, 93°46'15" W, elev 310 ft, 17 Sep 1986, *Orzell, Bridges, & G. Watson 4752* (SMU, TEX), 13 Aug 1987, *Orzell & Bridges 5712* (NCU, SMU, TEX), *Orzell & Bridges 5713A* (GA, TEX, VDB); Upper edges of acid seep forest in ravine just W of arm of Toledo Bend Res, reached by dirt road E from FS Rd 196, Sabine NF, Fairmount 7.5' Quad, 31°09'20" N, 93°38'21" W, elev 180-200 ft, 14 Oct 1987, *Orzell & Bridges 5910* (SMU, TEX). Sabine Co: Small, low hillside seepage bog on W facing slope of upper reaches of W-most of two major ravines S of FS Rd 196, Sabine NF, Fairmount 7.5' Quad, 31°11'24" N, 93°38'16" W, elev 300 ft, 14 Oct 1987, *Orzell & Bridges 5906* (SMU, TEX). Additional collections: TX: Tyler Co: Meadow along stream feeding Hyatt Lake about 1.5 mi S of Warren, 14 Oct 1966, *D.S. Correll 34034* (TEX) (Det: E.L. Bridges, 1987).

*Xyris platylepis* seems to be an uncommon species in the West Gulf Coastal Plain, but with a wide range of habitat preferences. Our Texas collections are all from the Catahoula Formation (Miocene), in a hillside seepage bog, on gravel bars and streamsides of a small, rocky spring fed creek, along banks of a sandy spring fed creek and at the upper edges of an acid seep forest. In these habitats it occurs with few or no other *Xyris* species and with different asso-

ciates at each site. Historical sites in Texas also occurred on the Bentley and Willis Formations (Quaternary). Our Louisiana sites are from transitional areas between hillside seepage bogs and the surrounding longleaf pine savannahs on escarpments of the Bentley and Willis Formations (Quaternary), generally on drier, finer-textured soil than other *Xyris* species at these sites.

Kral (1966b) reports this species, primarily of the South Atlantic and East Gulf Coastal Plain, from Natchitoches and Vernon Parishes, Louisiana. Later, he reported *Xyris platylepis* (Kral 1973) from a seepage area in Jasper Co, Texas. To our knowledge, the cited collections represent the only other Texas locations. A search of probable sites of the Kral collection did not reveal any *X. platylepis* there in 1986 or 1988. This species is represented for western Louisiana by specimens from Sabine and Vernon parishes at LSU and NLU. Throughout its main range, *X. platylepis* is somewhat weedy and not as restricted to seepage areas as many other species and can flourish on moist sites with no surface water (Kral 1966b). While common further east, we suspect that this species is uncommon in Louisiana and Texas.

*XYRIS SCABRIFOLIA* Harper (Xyridaceae). LA: Beauregard Par: High hillside seepage bog on S facing slope below timber road, ca 3 mi E and 1.2 mi N of Merryville, 0.3 mi N of railroad and S of Bridge Creek, center of NH, SWQ, Sec 28, T3S, R11W, Merryville North 7.5' Quad, 30°46'17" N, 93°30'01" W, elev 130-140 ft, 26 Jul 1988, *Orzell & Bridges 7484* (MO, NCU, NLU, SMU, TEX, VDB), *Orzell & Bridges 7485* (NLU, TEX). Vernon Par: NEQ, SEQ, Sec 12, T1S, R8W, Large open hillside seepage bog known as "Cravens Bog," just NW of int FS Rds 405-1, 405, 445 and 408, Sugartown NW 7.5' Quad, 30°59'27" N, 93°08'10" W, Kisatchie NF, 14 Aug 1987, *Orzell & Bridges 5742* (NLU, TEX); SEQ, NEQ, Sec 14, T1S, R8W, hillside seepage bog on S side FS Rd 405-1, 0.3 mi E of int FS Rds 400 & 471, Sugartown NW 7.5' Quad, 30°58'50" N, 93°09'05" W, Kisatchie NF, 14 Aug 1987, *Orzell & Bridges 5724* (NLU, TEX); EH, NEQ, SEQ, Sec 9, T1N, R11W, Upper edge of acid seep forest on N side of Pearl Creek, on E side LA 111, 0.5 mi N of LA 8, Burr Ferry 7.5' Quad, 31°04'36" N, 93°29'20" W, 13 Aug 1987, *Orzell & Bridges 5715* (TEX); NEQ, NWQ, Sec 32, T2N, R10W, Hillside seepage bog on W facing ravine slope on N side LA 8, opposite int Vernon Par Rd #15, 1.85 mi W of int LA 464, Burr Ferry 7.5' Quad, 31°06'47" N, 93°25'00" W, 13 Aug 1987, *Orzell & Bridges 5722* (NLU, TEX). TX: Angelina Co: Upper slope hillside seepage bog E of FS Rd 313, 0.7 mi S of FS Rd 302, Boykin Spring 7.5' Quad, 31°04'45" N, 94°16'03" W, elev 300-340 ft, 10 Aug 1987, *Orzell & Bridges 5607* (FSU, GA, MO, NCU, SMU, TEX, VDB); Mid-slope hillside seepage bog on SW side of US 63, ca 0.5 mi N of Jasper Co line, just S of int FS Rd 347, Angelina NF, Ebenezer 7.5' Quad, 31°04'46" N, 94°14'33" W, elev 280-300 ft, 10 Aug 1987, *Orzell & Bridges 5601* (NCU, SMU, TEX, VDB); Hillside seepage bog on SW side of TX 63, 0.2 mi N of Jasper Co line, Angelina NF, Ebenezer 7.5' Quad, 31°04'46" N, 94°14'33" W, elev 280-300 ft, 22 Sep 1986, *Orzell & Bridges 4780* (TEX), 10 Aug 1987, *Orzell & Bridges*

5602 (TEX); Mid-slope hillside seepage herb bog, SW of FS Rd 313 & 313A, N of Boykin Spring Lake and Recreation Area, Angelina NF, Boykin Spring 7.5' Quad, 31°04'12" N, 94°16'40" W, elev 270 ft, 10 Aug 1987, *Orzell & Bridges 5610* (SMU, TEX), 26 Aug 1988, *Orzell & Bridges 8294* (NCU, TEX); Steep upper slope hillside seepage bog N of FS Rd 314, 1.7 mi E of US 69, on SE facing slope, Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°03'15" N, 94°22'20" W, elev 200 ft, 24 Jul 1986, *Orzell & Bridges 4508* (TEX), 11 Aug 1987, *Orzell & Bridges 5631* (SMU, TEX); Small, open gently sloping hillside seepage bog NW of FS Rd 328A (closed), ca 1.7 mi E of US 69, N of FS Rd 314, Upland Island WA, Angelina NF, Boykin Spring 7.5' Quad, 31°03'27" N, 94°22'20" W, elev 200 ft, 11 Aug 1987, *Orzell & Bridges 5636* (SMU, TEX); Steep (30-40%) upper slope hillside seepage bog 0.7 mi N of FS Rd 314, ca 1.7 mi E of US 69, SE of FS Rd 328A (closed), Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°03'30" N, 94°22'12" W, elev 240-250 ft, 16 Sep 1986, *Orzell & Bridges 4741* (TEX), 11 Aug 1987, *Orzell & Bridges 5633* (TEX); Upper slope hillside seepage bog SW of FS Rd 330 (closed), ca 1 mi S of FS Rd 338, on SW facing slope, Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°03'47" N, 94°21'13" W, elev 220-230 ft, 11 Aug 1987, *Orzell & Bridges 5619* (SMU, TEX); Mid-slope hillside seepage bog SW of FS Rd 330 (closed), ca 1 mi S of FS Rd 338, on SW facing slope, Angelina NF, Upland Island WA, Boykin Spring 7.5' Quad, 31°03'35" N, 94°21'00" W, elev 200-210 ft, 11 Aug 1987, *Orzell & Bridges 5627* (NCU, SMU, TEX, VDB); Upper slope seepage area SE of FS Rd 313A, 1.2 mi W of jct FS Rd 313, on upper slopes of tributary draining S to Boykin Spring Recreation Area, ca 9.7 air miles SE of Zavalla, Angelina NF Boykin Spring 7.5' Quad, 31°04'16" N, 94°16'46" W, elev 250-270 ft, 26 Aug 1988, *Orzell & Bridges 8290* (SMU, TEX); Lower slope seepage area ca 0.3 mi W on FS Rd 313A from FS Rd 313, above headwaters of unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air miles SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'41" N, 94°16'24" W, elev 310-320 ft, 26 Aug 1988, *Orzell & Bridges 8299* (TEX); Mid-slope hillside seepage bog ca 0.8 mi W on FS Rd 313A from FS Rd 313, vicinity of headwaters of unnamed tributary to Boykin Spring Lake, ca 9.7 air miles SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'37" N, 94°16'40" W, elev 290-320 ft, 26 Aug 1988, *Orzell & Bridges 8305* (NCU, SMU, TEX); Upper slope hillside seepage bog ca 1.6 mi S of FS Rd 313 & TX 63, near FS Rd 313 & FS Rd 327, then 0.3 air mi W, on W side of tributary draining S to Boykin Spring Lake, 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'23" N, 94°16'23" W, elev 250-270 ft, 26 Aug 1988, *Orzell & Bridges 8313* (GA, SMU, TEX, VDB); Upper slope hillside seepage bog ca 1.9 mi S on FS Rd 313 from TX 63, then 0.2 air mi W to W facing slope above tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'17" N, 94°16'24" W, elev 250-260 ft, 26 Aug 1988, *Orzell & Bridges 8320* (MO, SMU, TEX); Upper slope hillside seepage bog 0.4 air miles W of FS Rd 302A at a



point ca 1.3 mi S of FS Rd 302, ca 0.6 air mi N of Jasper Co line, on slope N of tributary to Big Creek, ca 10 mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'20" N, 94°17'45" W, elev 210-240 ft, 26 Aug 1988, *Orzell & Bridges 8328* (SMU, TEX); Mid-slope hillside seepage bog 0.3 mi W of FS Rd 302A, ca 1.1 mi S of FS Rd 302, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'37" N, 94°17'44" W, elev 220-250 ft, 20 Sep 1988, *Orzell & Bridges 8339* (SMU, TEX); Upper slope hillside seepage bog ca 0.4 mi W of FS Rd 302A, 1.2 mi S of FS Rd 302, on SW facing slope of tributary to Big Creek, ca 9.5 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'32" N, 94°17'45" W, elev 200-220 ft, 20 Sep 1988, *Orzell & Bridges 8344* (TEX). Jasper Co: Open hillside seepage bog on N side of FS Rd 314, 3.9 mi E of US 69, 0.2 mi W of int FS Rd 330, Boykin Spring 7.5' Quad, 31°02'48" N, 94°20'31" W, elev 150-180 ft, 24 Jul 1986, *Orzell & Bridges 4515* (TEX, VDB), 11 Aug 1987, *Orzell & Bridges 5630* (FSU, GA, NCU, SMU, TEX); Upper steep slope hillside seepage bog with sandstone outcrops on tributary of Rock Creek, ca 4 mi E of Brownell (E on FM 1007 for 1.8 mi, then left fork 1.3 mi, right fork 0.2 mi and left fork 0.4 mi), on property of Mr. Paul Grubbs, Little Rocky Nature Preserve, Harrisburg 7.5' Quad, 31°06'45" N, 93°55'48" W, elev 280-310 ft, 6 Aug 1986, *Orzell & Bridges 4675* (TEX); Upper slope hillside seepage bog W of FS Rd 330, SW of int FS Rd 330A, WSW of Rockwall Cem, Angelina NF, Boykin Spring 7.5' Quad, 31°03'06" N, 94°20'36" W, elev 190-200 ft, 11 Aug 1987, *Orzell & Bridges 5628* (SMU, TEX); Hillside seepage bog SW along pipeline right-of-way from jct R255, 1.7 mi E of FM 1007, just E of Rayburn Country, McGee Bend 7.5' Quad, 31°03'24" N, 94°00'35" W, elev 350-360 ft, 12 Aug 1987, *Orzell & Bridges 5669* (NCU, SMU, TEX); High hillside seepage bog along pipeline right-of-way 0.3 mi SW of R255, 1.7 mi E of FM 1007, just E of Rayburn Country, McGee Bend 7.5' Quad, 31°03'17" N, 94°00'43" W, elev 330-350 ft, 12 Aug 1987, *Orzell & Bridges 5671* (GA, MO, SMU, TEX); Mid-slope hillside seepage bog on S side of FM 1007, on N side of crossing of Little Tiger Creek, McGee Bend 7.5' Quad, 31°05'45" N, 94°00'54" W, elev 180-190 ft, 12 Aug 1987, *Orzell & Bridges 5673* (SMU, TEX); Upper slope hillside seepage bog ESE of FS Rd 313A, ca 1.4 mi W of FS Rd 313, on slopes above unnamed tributary draining S to Boykin Spring Lake, ca 9.7 air mi SE of Zavalla, Angelina NF, Boykin Spring 7.5' Quad, 31°04'09" N, 94°16'49" W, elev 230-250 ft, 26 Aug 1988, *Orzell & Bridges 8283* (NY, SMU, TEX, VDB). Newton Co: Extensive high hillside seepage bog, frequently burned, along SW facing slope along tributary to Wet Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'15" N, 93°48'07" W, elev 300-350 ft, 13 Aug 1987, *Orzell & Bridges 5702* (NCU, SMU, TEX, VDB); Mid-slope hillside seepage bog, overgrown with shrubs, along SW facing slope of valley of Wet Hurricane Creek, NNE of landing strip in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°07'55" N, 93°47'54" W, elev 320-350 ft, 13 Aug 1987, *Orzell & Bridges 5697* (TEX); Upper slope hillside

seepage bog on W to SW facing slope along Dry Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'00" N, 93°48'43" W, elev 310-330 ft, 13 Aug 1987, *Orzell & Bridges 5704* (SMU, TEX); Extensive mid to upper slope hillside seepage bog in upper reaches of tributary to Wet Hurricane Creek, in area known as "Scrappin' Valley," Hurricane Creek 7.5' Quad, 31°08'35" N, 93°47'46" W, elev 320-350 ft, 13 Aug 1987, *Orzell & Bridges 5711* (SMU, TEX); Lower slope hillside seepage bog in pine plantation on E side of East Prong McKim Creek, W of gravel rd from 1.5-1.7 mi N of Co rd int at BM 532 on topo, Harrisburg 7.5' Quad, 31°06'24" N, 93°53'24" W, elev 360-380 ft, 13 Aug 1987, *Orzell & Bridges 5690* (MO, SMU, TEX); Hillside seepage bog, mostly shrub invaded, ca 0.4 mi SE of TX 87 at a point 0.3 mi S of Sabine Co line, on N side of tributary N of Mill Creek and just E of pipeline right-of-way, Fairmount 7.5' Quad, 31°09'26" N, 93°43'45" W, elev 370-380 ft, 25 Aug 1988, *Orzell & Bridges 8241* (SMU, TEX); Hillside seepage bog, mostly shrub invaded, ca 0.5 mi E and 0.5 mi S from TX 87 at a point 0.3 mi S of Sabine Co line, on E side of small tributary N of Mill Creek, Fairmount 7.5' Quad, 31°09'23" N, 93°43'24" W, elev 330-350 ft, 25 Aug 1988, *Orzell & Bridges 8247* (SMU, TEX, VDB); Hillside seepage bog, almost entirely shrub invaded, ca 2.5 mi E of TX 87 at a point 0.3 mi S of Sabine Co line, at head of small tributary N of Mill Creek, Fairmount 7.5' Quad, 31°09'46" N, 93°41'36" W, elev 300-320 ft, 25 Aug 1988, *Orzell & Bridges 8250* (GA, MO, NCU, SMU, TEX); Acid seep forest and hillside seepage bog ca 2 mi E of TX 87 at a point 0.3 mi S of Sabine Co line, on W side of valley of tributary N of Mill Creek, Fairmount 7.5' Quad, 31°09'47" N, 93°42'03" W, elev 330-350 ft, 25 Aug 1988, *Orzell & Bridges 8256* (FSU, NLU, SMU, TEX). Sabine Co: Lower slope hillside seepage bog in valley of Shingle Branch, east of Fox Hunters Hill, 0.5 mi N of FS Rd 113, 0.5 mi E of TX 87, Sabine NF, Fairmount 7.5' Quad, 31°11'22" N, 93°43'14" W, elev 270 ft, 12 Aug 1987, *Orzell & Bridges 5648* (NCU, SMU, TEX, VDB). Additional collections: TX: Angelina Co: Present in hillside bog below Hwy 63 at first guardrail south of int with FR 347 of the Angelina National Forest and just north of Jasper Co line, 3 Aug 1986, *L.E. Brown 10616* (SBSC) [det: E.L. Bridges, Feb. 1987].

*Xyris scabrifolia* is frequent in hillside seepage bogs on the Catahoula Formation (Miocene) or near the contact of the Catahoula and Willis (Quaternary) Formations in four counties of southeast Texas. In southwestern Louisiana, it occurs in hillside seepage bogs formed at the contact of the sandy Willis or Bentley Formations (Quaternary) with underlying clayey Miocene or Quaternary strata. Within these sites, *X. scabrifolia* is found both within open boggy areas and in partial shade of evergreen shrub thickets, often on hummocks of *Sphagnum* sp. Frequently associated species in Louisiana and Texas include *Aletris aurea*, *Calopogon tuberosus*, *Centella asiatica*, *Coreopsis linifolia*, *Drosera capillaris*, *Eriocaulon decangulare*, *E. texense*, *Eryngium integrifolium*, *Eupatorium rotundifolium*, *Fuirena squarrosa*, *Helianthus angustifolius*, *Liatris pycnostachya*, *Lycopodium appressum*, *Magnolia virginiana*, *Marshallia*

*tenuifolia*, *Mitreola sessilifolia*, *Myrica cerifera*, *M. heterophylla*, *Osmunda cinnamomea*, *O. regalis*, *Persea borbonia*, *Pogonia ophioglossoides*, *Ptilimnium costatum*, *Rhezia mariana*, *R. petiolata*, *Rhus vernix*, *Rhynchospora chalarocephala*, *R. gracilentia*, *R. macra*, *R. oligantha*, *Rudbeckia scabrifolia*, *Sarracenia alata*, *Scleria reticularis*, *Smilax laurifolia*, *Utricularia juncea*, *Xyris ambigua*, *X. baldwiniana* and *X. difformis* var. *curtissii*.

This series of records is perhaps the most unusual result of our field surveys for *Xyris* in the West Gulf Coastal Plain. *Xyris scabrifolia* was first collected by Harper in 1901, on the Piedmont Plateau in Meriwether Co, Georgia (Harper 1903), where it has never again been seen. The next collections of this species were made in the Florida panhandle, where by 1960 it was known from three sites in as many counties (Kral 1960). No additional counties are recorded for this species in Kral (1966b). Kral (1966c) next reported *X. scabrifolia* as new to Alabama from Baldwin Co and noted it to be a suspected hybrid. In Kral (1983) the hybrid question is not mentioned and the species was recorded for a total of fifteen counties in southern Georgia, Alabama, Mississippi and the Florida panhandle. Since that time, a few additional records have been added in southern Mississippi, where we have found it to be a frequent characteristic species of hillside seepage bogs and sapric deep muck bogs. When we first collected this species in Texas, we considered it to be a rare disjunct from the East Gulf Coastal Plain. However, when we began to systematically search our hillside bog sites, we found it from a total of at least 34 localities in Texas and five others in Vernon and Beauregard parishes, Louisiana. While annotating *Xyris* at Texas herbaria we came across a previously unidentified sheet at SBSC and recognized it as *X. scabrifolia*.

Some of our specimens of *Xyris scabrifolia* are more robust than previous descriptions of the species would indicate. We found this species to vary greatly in size, with larger plants tending to occupy partially shaded conditions. Our specimens have scapes to 120 cm tall, twice the previous maximum length reported for this species (Kral 1983). We also observed some variability in the time of day when the petal blades are open. From 7:30 to 8:00 AM CDT on August days the petals were variously open, partially open, or completely closed, varying both within and between populations. Populations were seen with all fully open flowers by 10:00 AM, however, on overcast days some flowers had not fully opened by 11:00 AM. *Xyris scabrifolia* had previously been reported as having open petal blades only in the afternoon hours (Kral 1983). All of our specimens have the papillate leaf surfaces, scape surfaces and sub-orbicular 5 mm long petal blades characteristic of this species. The specimens with mature seeds all have the narrowly ellipsoidal, relatively long seeds which distinguish this species. In field examination of thousands of West Gulf Coastal Plain plants, we found no evidence of hybridization or introgression involving *X. scabrifolia* and noted that it generally occurs in the absence of the most similar species, *X. platylepis*.

*XYRIS SMALLIANA* Nash (Xyridaceae). TX: Hardin Co: Deep, peat



based pond on riverine sand ridge on N side of railroad, ca 0.5 mi E of Village Creek and 0.8 mi S of FM 418, ca 4 mi E of Kountze, Alligator Grass Lake, Roy E. Larsen Sandylands Sanctuary, Kountze North 7.5' Quad, 30°23'02" N, 94°15'20" W, elev 48 ft, 23 Aug 1988, Orzell & Bridges 8200 (NCU, SMU, TEX, VDB). Jasper Co: Large open graminoid dominated flatwoods pond N of dirt road, 2.4 mi E of LeVerte, 2.9 mi E of US 96, 7 mi N of TX 62 at Buna, Call Junction 7.5' Quad, 30°32'00" N, 94°54'00" W, 23 Aug 1988, Orzell & Bridges 8174 (GA, MO, SMU, TEX, VDB). Tyler Co: Intermediate depth flatwoods pond N of gravel rd, 3.9 mi W of TX 92 at a point 1 mi N of Fred, E of Drakes Branch and W of Spring Branch, Fred 7.5' Quad, 30°35'37" N, 94°13'55" W, elev 124 ft, 26 Sep 1988, Orzell & Bridges 8587 (TEX), Orzell & Bridges 8591 (FSU, GA, NCU, SMU, TEX, VDB); Intermediate depth flatwoods pond on S side of gravel rd, 4.5 mi W of FM 92 at a point ca 1 mi N of Fred, E of Drakes Branch, Fred 7.5' Quad, 30°35'28" N, 94°14'25" W, elev 128 ft, 26 Sep 1988, Orzell & Bridges 8594 (DUKE, MO, NCU, NLU, NY, SMU, TEX, VDB).

*Xyris smalliana* is restricted in Texas to open flatwoods ponds on the Bentley and Montgomery Formations (Quaternary). It is most frequently associated with *Bacopa caroliniana*, *Cephalanthus occidentalis*, *Cyrilla racemiflora*, *Eriocaulon compressum*, *Gratiola brevifolia*, *Juncus repens*, *Liquidambar styraciflua*, *Ludwigia sphaerocarpa*, *Manisuris rugosa*, *Nyssa sylvatica* var. *biflora*, *Panicum hemitomon*, *Pluchea rosea*, *Proserpinaca pectinata*, *Rhynchospora cephalantha*, *R. filifolia*, *R. perplexa*, *R. tracyi*, *Sphagnum macrophyllum*, *Styrax americana*, *Utricularia gibba* and *Xyris fimbriata*.

Previous to these collections, the western reported limit of *Xyris smalliana* was in George Co in southern Mississippi (Kral 1966b). We have also collected this species in Stone and Harrison counties in Mississippi. The Texas collections are disjunct 450 km from these localities. *Xyris smalliana* is one of the few *Xyris* species to reach to northeast United States, ranging as far as Maine (Kral 1966b). Throughout the southeastern Coastal Plain, it is commonly and consistently found with *X. fimbriata*, one of its Texas associates. Although *X. smalliana* has been reported from Louisiana (MacRoberts 1984), we consider the source of this report as a probable misidentification. No Louisiana specimens are at LAF, LSU, or NLU.

## DISCUSSION

The species accounts in this paper have described the Texas and Louisiana range and habitats of individual species and the relation of these to their total ranges. It is obvious that several of these species fit similar patterns of habitat preference, overall distribution and type of range extension or disjunction. Therefore, we will consider the correlations in these patterns between the species reported in this paper.

Most of the new records in this paper are westward extensions of species of the eastern or southeastern United States, particularly those ranging on the

South Atlantic and East Gulf Coastal Plain. Several of these are found in wetland habitats primarily on the outer South Atlantic and East Gulf Coastal Plain. These include *Carex verrucosa*, *Rhynchospora cephalantha*, *R. chalarocephala*, *R. tracyi*, *Xyris fimbriata*, *X. platylepis* and *X. smalliana*. Several others were once considered endemic or near endemic to a small area of the outer Gulf Coastal Plain from the Florida panhandle west to southern Mississippi. These include *Lachnocaulon diggnum*, *Polygala crenata*, *Rhynchospora stenophylla*, *Xyris drummondii* and *X. scabrifolia*. *Ludwigia microcarpa* and *Platanthera integra* are found primarily on the Coastal Plain, but have several isolated localities in the interior southeast. Two species reported here extend from the southeastern Coastal Plain south into tropical zones. *Rhynchospora divergens* is primarily Floridian and West Indian, whereas *Scleria verticillata* extends both to South America and north into wetlands of glaciated North America, particularly near the Great Lakes. The Texas and Louisiana habitats of all of the above species are very similar to those throughout their southeast Coastal Plain ranges.

Three additional wetland species are disjunct to Texas from range centers in the northern United States. *Cladium mariscoides* is most common in the extreme northeastern states and is rare in unglaciated territory. *Psilocarya scirpoides* seems to be most frequent in the glaciated north central United States, but has isolated localities in most southeastern states. Both of these are clearly of Coastal Plain origin, but have apparently been less successful in persisting there than in spreading to the wetlands of glaciated areas. *Carex bromoides* is more widespread in the eastern states, but is uncommon in the southeast and rare west of the Mississippi River.

The mesic forest species reported here are generally westward range extensions from the eastern or southeastern states. *Carex willdenowii* and *Uvularia perfoliata* are widespread in the eastern and southeastern states, but rare west of the Mississippi River. *Styrax grandifolia* is frequent in much of the southeastern states and *Acer leucoderme* ranges mostly on the Piedmont Plateau and inner Coastal Plain, with extensions into adjacent provinces. *Rudbeckia triloba*, *Thaspium barbinode* and *T. trifoliatum* are common in much of the east and east central United States and are found both east and north of Texas, but are rare calciphiles on the outer Coastal Plain.

*Rudbeckia subtomentosa* is most common in the central prairie/woodland border states, occupying a wide range of habitats. *Liatris punctata* is a species of the southern Great Plains, widespread in Texas but restricted eastward. Three species in this paper are endemic or near endemic to the West Gulf Coastal Plain. *Rudbeckia scabrifolia* is one of the few such endemics restricted to the longleaf pine belt. *Spiranthes parksii* was considered to be endemic to a small region of the Post Oak Belt, but is disjunct to a similar habitat in the longleaf pine belt. *Cyperus grayioides*, although described from Illinois, is clearly most frequent and abundant in the deep sands of the Post Oak Belt of Texas and in restricted areas in the pine region of Texas and Louisiana.

*Palafoxia tezana* var. *ambigua* (and the species as a whole) is a near endemic of the Tamaulipan Biotic Province, now extending eastward in the outer West Gulf Coastal Plain.

It is obvious from the above new records and confirmations of reports from southeastern Texas and southwestern Louisiana that much work remains in documenting the diverse flora of these sections of the states. In particular, more attention needs to be given to the role of specialized habitats in overall floristic diversity and to the more difficult and large families, particularly monocots. The discovery of three additional species of *Xyris* in Texas, additional localities for another known previously from a single site, as well as a previously undescribed species, *Xyris louisianica* (Bridges & Orzell 1987), is particular evidence of the need for specialized and critical collecting. For *Xyris fimbriata*, *X. scabrifolia*, *X. smalliana*, *Lachnocaulon digynum*, *Rhynchospora cephalantha*, and *R. stenophylla* the collections reported are not only the first for Texas, but are also the first confirmed reports of these species from the West Gulf Coastal Plain and from west of the Mississippi River. One of these (*X. smalliana*) is not known to occur in Louisiana, and has its nearest locations to Texas over 450 km distant in southern Mississippi. The longest disjunction reported here and the one most likely to represent relictual populations, is that of *Cladium mariscoides*, 800 km from the nearest historical record and 1250 km from the edge of its relatively continuous range. This indicates that the Texas flora may include other long-disjunct or relictual species and this possibility should be considered in field and herbarium studies.

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## NEW OR RESTORED GENERA OF BROMELIACEAE

Lyman B. Smith and W. John Kress

Department of Botany, Smithsonian Institution, Washington, D.C.

### ABSTRACT

New nomenclatural combinations are enumerated in 7 genera of Bromeliaceae.

KEY WORDS: Bromeliaceae, Neotropics, nomenclature.

In Flora Neotropica Monograph No. 14 (Smith & Downs 1979) the key to genera required 9 entries to cover the 8 subgenera of *Aechmea* while the distinctions were no better than those elsewhere in the key. Consequently it seems not only logical but also convenient to erect or restore the subgenera into genera as follows.

**PODAECHMEA** (Mez) Smith & Kress, comb. nov. Lectotype *Pironneava lueddemanniana* K. Koch.

*P. ferruginea* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea ferruginea* L.B. Smith, Contr. Gray Herb. 98:5, pl 1, figs 1-3. 1932.

*P. galeottii* (Baker) Smith & Kress, comb. nov. Basionym: *Aechmea galeottii* Baker, Handb. Bromel. 51. 1889.

*P. lueddemanniana* (K. Koch) Smith & Kress, comb. nov. Basionym: *Pironneava lueddemanniana* K. Koch, Wochenschr. Gartnerei Pflanzenk. 9:182. 1866.

*P. macvaughii* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea macvaughii* L.B. Smith, Phytologia 10:481, pl 1, figs 8,9. 1964.

*P. mexicana* (Baker) Smith & Kress, comb. nov. Basionym: *Aechmea mexicana* Baker, J. Bot. 17:165. 1879.

**LAMPROCOCCLUS** Beer. Lectotype *Lamprococcus fulgens* (Brongniart) Beer.

*L. brevicollis* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea brevicollis* L.B. Smith, Contr. Gray Herb. 154:32, pl 3, figs 1,2. 1945.

*L. campanulatus* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea campanulata* L.B. Smith, Mem. New York Bot. Gard. 9:316, fig 61. 1957.

- L. carvalhoi** (E. Pereira & Leme) Smith & Kress, comb. nov. Basionym: *Aechmea carvalhoi* E. Pereira & Leme in E. Pereira, E.M. C. Leme & I. Penna, *Bradea* 4(34):267, fig 1, g-l. 1985.
- L. cathcartii** (C.F. Reed & R.W. Read) Smith & Kress, comb. nov. Basionym: *Aechmea cathcartii* C.F. Reed & R. W. Read, *J. Brom. Soc.* 31(2):59, fig 1981.
- L. farinosus** Regel, *Ind. Sem. Hort. Petrop.* for 1868: 79. 1869. *L. farinosus* var. *farinosus*.
- L. farinosus** var. *glomeratus* (Beer) Smith & Kress, comb. nov. Basionym: *Lamprococcus glomeratus* Beer, *Bromel.* 105. 1856.
- L. farinosus** var. *discolor* (Beer ex Baker) Smith & Kress, comb. nov. Basionym: *Aechmea conglomerata* var. *discolor* Beer ex Baker, *Handb. Bromel.* 53. 1889.
- L. fulgens** (Brongniart) Beer, *Bromel.* 103. 1856. *L. fulgens* var. *fulgens*. Basionym: *Aechmea fulgens* Brongniart, *Ann. Sci. Nat. Bot.* II. 15:571. 1841.
- L. fulgens* var. *discolor* Brongniart ex Beer, *Bromel.* 104. 1856.
- L. miniatus* Beer, *Bromel.* 104. 1856. *L. miniatus* var. *miniatus*.
- L. miniatus* var. *discolor* Beer, *Bromel.* 104. 1856.
- L. pedicellatus** (E.M.C. Leme & H.E. Luther) Smith & Kress, comb. nov. Basionym: *Aechmea pedicellata* Leme & Luther, *J. Bromeliad Soc.* 38(4):150, fig 4. 1988.
- L. podanthus** (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea podantha* L.B. Smith, *Smithsonian Misc. Collect.* 126:18,203, fig 95. 1955.
- L. racinae** (L.B. Smith) Smith & Kress, comb. nov. *L. racinae* var. *racinae*. Basionym: *Aechmea racinae* L.B. Smith, *Arq. Bot. Estado São Paulo* 1:56, pl 71. 1941.
- L. racinae** var. *erectus* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea racinae* var. *erecta* L.B. Smith, *Arch. Jard. Bot. Rio de Janeiro* 10:142. 1950.
- L. racinae** var. *tubiformis* (E. Pereira) Smith & Kress, comb. nov. Basionym: *Aechmea racinae* var. *tubiformis* E. Pereira, *Bradea* 1(18):161. 1972.
- L. victorianus** (L.B. Smith) Smith & Kress, comb. nov. *L. victorianus* var. *victorianus*. Basionym: *Aechmea victoriana* L.B. Smith, *Arq. Bot. Estado São Paulo* 1:57, pl 73, fig 1. 1941.
- L. victorianus** var. *discolor* (M.B. Foster) Smith & Kress, comb. nov. Basionym: *Aechmea victoriana* var. *discolor* M.B. Foster, *Bull. Bromeliad Soc.* 5:29, fig 1955.
- L. warasii** (E. Pereira) Smith & Kress, comb. nov. Basionym: *Aechmea warasii* E. Pereira, *Bradea* 1(18):160, fig 2. 1972.
- L. weilbachii** (Didrichsen) E. Morren, *Belgique Hort.* 11:305, fig. 1861. Basionym: *Aechmea weilbachii* Didrichsen, *Ann. Sci. Nat. Bot.* IV. 2:375. 1854.

*ORTGIESIA* Regel. Type *Ortgiesia tillandsioides* Regel.

- O. *alegrensis* (Weber) Smith & Kress, comb. nov. Basionym: *Aechmea alegrensis* Weber, Feddes Repert. 97(3-4):110, fig 11. 1986.
- O. *apocalyptic*a (Reitz) Smith & Kress, comb. nov. Basionym: *Aechmea apocalyptic*a Reitz, Sellowia 14:99, fig 1. 1962.
- O. *bicolor* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea bicolor* L.B. Smith, Smithsonian Misc. Collect. 126:12,213, fig 100. 1955.
- O. *blumenavii* (Reitz) Smith & Kress, comb. nov. *O. blumenavii* var. *blumenavii* Basionym: *Aechmea blumenavii* Reitz, Anais Bot. Herb. "Barbosa Rodrigues" 4:21, pl 6. 1952.
- O. *blumenavii* var. *alba* (Reitz) Smith & Kress, comb. nov. Basionym: *Aechmea blumenavii* var. *alba* Reitz, Bromeliaceae Fl. Illustr. Catar. 1:412. 1983.
- O. *burle-marxii* (E. Pereira) Smith & Kress, comb. nov. Basionym: *Aechmea burle-marxii* E. Pereira, Bradea 2(47):307, fig A. 1979.
- O. *calyculata* (E. Morren) Smith & Kress, comb. nov. Basionym: *Hoplophytum calyculatum* E. Morren, Belgique Hort. 15:162, pl 11. 1965.
- O. *candida* (E. Morren ex Baker) Smith & Kress, comb. nov. Basionym: *Aechmea candida* E. Morren ex Baker, Handb. Bromel. 41. 1889.
- O. *caudata* (Lindman) Smith & Kress, comb. nov. *O. caudata* forma *caudata*. Basionym: *Aechmea caudata* Lindman, Kongl. Svenska Vetenskapsakad. Handl. 24(8):29, pl 6, figs 1-9. 1891.
- O. *caudata* forma *albiflora* (Weber & Roeth) Smith & Kress, comb. nov. Basionym: *Aechmea caudata* forma *albiflora* Weber & Roeth in W. Weber, Feddes Repert. 93(5):337. 1982
- O. *coelestis* (K. Koch) Smith & Kress, comb. nov. *O. coelestis* var. *coelestis*. Basionym: *Hoplophytum coeleste* K. Koch, Ind. Sem. Hort. Berol. for 1856 (App.):6. 1857.
- O. *coelestis* var. *acutifolia* (E. Pereira) Smith & Kress, comb. nov. Basionym: *Aechmea coelestis* var. *acutifolia* E. Pereira, Bradea 2(49):322. 1979.
- O. *coelestis* var. *albo-marginata* (M.B. Foster) Smith & Kress, comb. nov. Basionym: *Aechmea coelestis* var. *albo-marginata* M.B. Foster, Bull. Bromeliad Soc. 7:91, fig 1957.
- O. *cylindrata* (Lindman) Smith & Kress, comb. nov. Basionym: *Aechmea cylindrata* Lindman, Kongl. Svenska Vetenskapsakad. Handl. III. 24(8):32, pl 8, figs 28-35. 1891.
- O. *gamosepala* (Wittmack) Smith & Kress, comb. nov. *O. gamosepala* var. *gamosepala*. Basionym: *Aechmea gamosepala* Wittmack, Bot. Jahrb. Syst. 13 (Beibl. 29): 3, 13. 1891.
- O. *gamosepala* var. *nivea* (Reitz) Smith & Kress, comb. nov. Basionym: *Aechmea gamosepala* var. *nivea* Reitz, Sellowia 14:101. 1962.
- O. *gracilis* (Lindman) Smith & Kress, comb. nov. Basionym: *Aechmea gracilis* Lindman, Kongl. Svenska Vetenskapsakad. Handl. 24(8):30, pl 6, figs 10-16. 1891.



- O. guaratubensis* (E. Pereira) Smith & Kress, comb. nov. Basionym: *Aechmea guaratubensis* E. Pereira, *Bradea* 1(25):278. 1972.
- O. kertesziae* (Reitz) Smith & Kress, comb. nov. *O. kertesziae* var. *kertesziae*. Basionym: *Aechmea kertesziae* Reitz, *Anais Bot. Herb. "Barbosa Rodrigues"* 4:24, pl 7-I. 1952.
- O. kertesziae* var. *viridi-aurata* (Reitz) Smith & Kress, comb. nov. Basionym: *Aechmea kertesziae* var. *viridi-aurata* Reitz, *Sellowia* 33:55. 1981.
- O. lindenii* (E. Morren) Smith & Kress, comb. nov. *O. lindenii* var. *lindenii*. Basionym: *Hoplophytum lindenii* E. Morren, *Belgique Hort.* 15:164. 1865.
- O. lindenii* var. *makoyana* (Mez) Smith & Kress, comb. nov. Basionym: *Aechmea lindenii* var. *makoyana* Mez, *Pflanzenreich* IV. 32:159. 1934.
- O. lymanii* (Weber) Smith & Kress, comb. nov. Basionym: *Aechmea lymanii* Weber, *J. Bromeliad Soc.* 34(5):202, fig 4. 1984.
- O. organensis* (Wawra) Smith & Kress, comb. nov. Basionym: *Aechmea organensis* Wawra, *Österr. Bot. Z.* 30:116. 1880.
- O. pimenti-velosoi* (Reitz) Smith & Kress, comb. nov. *O. pimenti-velosoi* var. *pimenti-velosoi*. Basionym: *Aechmea pimenti-velosoi* Reitz, *Anais Bot. Herb. "Barbosa Rodrigues"* 4:26, pl 8. 1952.
- O. pimenti-velosoi* var. *glabra* (Reitz) Smith & Kress, comb. nov. *Aechmea pimenti-velosoi* var. *glabra* Reitz, *Anais Bot. Herb. "Barbosa Rodrigues"* 5:256. 1953.
- O. recurvata* (Klotzsch) Smith & Kress, comb. nov. *O. recurvata* var. *recurvata*. Basionym: *Macrochordium recurvatum* Klotzsch, *Allg. Gartenzeitung* 24:393. 1856.
- O. recurvata* var. *benrathii* (Mez) Smith & Kress, comb. nov. Basionym: *Aechmea benrathii* Mez, *Feddes Repert.* 16:6. 1919.
- O. recurvata* var. *ortgiesii* (Baker) Smith & Kress, comb. nov. Basionym: *Aechmea ortgiesii* Baker, *J. Bot.* 17:236. 1879.
- O. seideliana* (Weber) Smith & Kress, comb. nov. Basionym: *Aechmea seideliana* Weber, *Feddes Repert.* 97(3-4):110, fig 11. 1986.
- O. winkleri* (Reitz) Smith & Kress, comb. nov. Basionym: *Aechmea winkleri* Reitz, *Bromelia* (Sellowia no. 26:) 1:63, pl 1. 1975.

**PLATYAECHMEA** (Baker) Smith & Kress, comb. nov. Type *Aechmea distichantha* Lemaire.

- P. anomala* (L.B. Smith) Smith & Kress, comb. nov. Basionym: *Aechmea anomala* L.B. Smith, *Caldasia* 3:237, fig 1945.
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- P. chantinii* (Carrière) Smith & Kress, comb. nov. Basionym: *Billbergia chantinii* Carrière, *Rev. Hort.* 50:112, fig 22. 1878; 52:272, figs 54-56. 1880.

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## TWO NEW SPECIES OF *PASSIFLORA* (PASSIFLORACEAE) FROM SOUTH AMERICA

Linda K. Escobar

Departamento de Biología, Universidad de Antioquia,

Apartado Aéreo 1226, Medellín, Colombia

Present address: Plant Resources Center, Department of  
Botany, University of Texas, Austin, TX 78713 USA.

### ABSTRACT

Recent botanical explorations have uncovered two new species of *Passiflora*, here described as *P. fernandezii* and *P. viridescens*. The first is placed in subgenus *Passiflora*, series *Laurifolia*, where it most closely resembles *Passiflora riparia*, the second in subgenus *Plectostemma*, section *Decaloba*, near *Passiflora chelidonea*.

KEY WORDS: *Passiflora*, systematics, South America.

*Passiflora fernandezii* L. Escobar, sp. nov. TYPE: BOLIVIA. Pando: Nicolas Suarez: entre Porvenir y Cachuelita, a lo largo de la pista, 19 Jan 1983, J. Fernández-Casas & A. Susanna 3341 (holotype NY; isotype MO).

*Passiflora* (subgenus *Passiflora* series *Laurifolia*) *ripariae* Masters similis, sed pubescentia et forma hypanthii differt.

Liana. Plants pubescent, with straight, transparent trichomes ca 0.5 mm long. Stems angulate, striate, gray-green, sparingly pubescent. Leaf blades oblong, (3.5-) 5.0-9.4 cm long, (1.4-) 2.5-4.2 cm wide, obtuse then abruptly acuminate at apex, rounded at base, entire at margins, coriaceous, lustrous, gray-green, glabrous except for a few scattered trichomes at base on abaxial surface; petioles 1.2-1.8 cm long, with 2 paired, dark brown cup shaped nectaries ca 1 mm diam at mid-point on adaxial surface; stipules linear, ca 1 cm long, ca 0.5 cm wide. Peduncles single, 2.1-3.0 cm long; bracts 3, verticillate, ovate. 1.9-2.4 cm long, 1.0-1.4 cm wide, acute to rounded at apex, cuneate at base, irregularly crenate at margins, with 4-6 dark brown nectaries scattered along margins above mid-point, densely pubescent; flower stipe ca 2 mm long. Flowers campanulate, ca 6 cm diam, pendant, white; hypanthium funnelform, 1.6-2.0 cm long, 2.4-2.9 cm wide at apex, 1.0-1.3 cm wide at base,

with irregular rows of filaments 0.5-2.0 mm long in lower 1/2 of inner surface; sepals ovate, 2.6-3.1 cm long, 1.5-2.1 cm wide, rounded at apex, softly coriaceous, with subapical corniculus ca 2 mm long on abaxial surface; petals oblong, ca 1.4 cm long, ca 0.7 cm wide, rounded at apex, narrowed at base, delicately membranaceous; corona in 2 series, filamentous, the outer filaments ca 6 mm long, ca 0.4 mm wide, the inner ones 2.3-2.5 cm long, ca 1.0 mm wide, banded with purple; operculum horizontal, nonplicate, membranaceous; ovary ellipsoidal, densely pubescent. Fruit unknown.

Distribution. This species is known only from the type collection in lowland Bolivia.

*Passiflora fernandezii* most closely resembles *P. riparia* Masters of subgenus *Passiflora* series *Laurifolia* (Killip 1938), but differs from it by the pubescence and shape of the hypanthium. Both of these characters are variable in collections ascribed to that species; the type, however, is described as glabrous (Masters 1872), and the illustration in *Flora Brasiliensis* depicts a cylindrical rather than funnellform hypanthium, so that further study of the *Passiflora riparia* complex is needed.

*Passiflora viridescens* L. Escobar, sp. nov. TYPE: PERÚ. Amazonas: Prov Chachapoyas: 22 km from Leimebamba on road to Balsas, ca 3000 m, 6°45' S, 77°48' W, 4 Feb 1985, B. Stein & C. Todzia 2083 (holotype MO).

*Passiflora* (subgenus *Plectostemma* section *Decaloba*) *chclidoneae* Masters similis morphologia foliarum, sed floribus multo majoribus sine operculo plicato et corona ligulata irregulari differt.

Herbaceous vine. Plants glabrous with angulate, striate stems. Leaf blades lanceolate, 12.0-12.8 cm long, 5.0-5.4 cm wide, 3 lobed at apex, with erect, triangular lateral lobes ca 1 mm long and mid-lobe ca 1 cm long, truncate to rounded at base, entire at margins, coriaceous; laminar nectaries ocellate, 10-13, located between major veins on abaxial surface; petioles 1.2-1.3 cm long; stipules falcate, 5-6 mm long, ca 1 mm wide. Peduncles paired, ca 4.5 cm long; bracts 3, dissitate, setaceous, 3-5 mm long, ca 0.5 mm wide. Flowers campanulate, ca 11 cm diam, probably pendant, greenish; hypanthium patelliform, ca 2 mm long, sepals narrowly triangular, 5.5 cm long, 1.1 cm wide at base, membranaceous; petals linear oblong, ca 2.8 cm long, 4-7 mm wide, membranaceous; corona in 1 irregular series, ligulate, with ligules ca 1.2-1.6 mm long; operculum spreading, lacerate to base, ca 0.7 mm long, membranaceous; ovary ellipsoidal, densely pubescent, with straight tan trichomes ca 0.1 mm long. Fruits unknown.

Distribution. This species is known only from the type collection in the Ceja de Montaña vegetation of Amazonas Department in northern Perú.

This new species is placed in subgenus *Plectostemma*, section *Decaloba* with species which Killip (1938), grouped in series "Punctatae." In leaf morphology, *Passiflora viridescens* resembles *P. chclidonea*, of the western slopes of the



Andes in southern Colombia and northern Ecuador. It differs from that species by the larger flowers with a reduced ligulate corona and nonplicate operculum.

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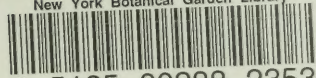
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